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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Northwest and Alaska Fisheries Center
Environmental Conservation Division
2725 Montlake Boulevard East
Seattle, Washington 98112

October 11, 1985

F/NWC6:COE

This went into T-91

Mr. Burt Hamner
Environmental Resources Section
Seattle District, U.S. Army Corps of Engineers
P.O. Box C-3755
Seattle, Washington 98124-2255

Dear Burt:

Enclosed is a draft report summarizing results of the chemical analyses and biological testing of Duwamish Waterway sediments collected during April 1985. Your thoughtful comments have been incorporated as discussed between Don Brown and you.

If you have any question, please contact me at 442-7737.

Sincerely,

Sin-Lam Chan

Sin-Lam Chan, PhD.
Deputy Division Director

Enclosure

*Core Samples
14 thru 19*

Composited to

*C 6 & C 7 for analysis
went into T-91*

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ANALYSES OF SEDIMENT SAMPLES FOR U.S. ARMY CORPS OF ENGINEERS
SEATTLE HARBOR NAVIGATION PROJECT OPERATIONS AND MAINTENANCE
SAMPLING AND TESTING OF DUWAMISH RIVER SEDIMENTS

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DRAFT

INTRODUCTION

Sediment samples were collected in the Duwamish Waterway during April 1985 and tested to determine suitability for disposal at the open-water disposal site at Four-Mile Rock in Elliott Bay. Selected sediment characteristics were determined and concentrations of organic pollutants and six metals were measured. Sediment toxicity was assessed using amphipod (Rhepoxynius abronius) bioassays and bacterial bioluminescence (Microtox) assays.

METHODS

Sampling

Twenty sediment core samples were collected April 15-19, 1985 at stations 251-275 in the Duwamish River (Figure 1, Table 1) using a vibracore sampler with clear plastic sample tubes. Reference sediment was collected in Sequim Bay by Battelle Northwest Marine Laboratory using a 0.1-m² modified Van Veen grab sampler. The sampling in the Duwamish River was conducted by Battelle under separate contract with the US Army Corps of Engineers (COE). Sediment was also collected in Bowman Bay (West Beach, Whidbey Island) by National Marine Fisheries Service personnel for use as a reference sediment in biological assays. After sampling, only glass, stainless steel, aluminum, or Teflon were allowed to contact the sediment to be analyzed for organic chemicals. These materials were rinsed with CH₂Cl₂ and air dried prior to use.

To represent sediments as they would be dredged, each core was divided into 4' lengths. Each 4' length of a core was treated as a separate sample and was emptied into a stainless steel container and thoroughly mixed. Four 1 quart containers of each sediment sample were collected and stored at 4°C on shipboard. At the end of each day the samples were transferred to the laboratory and stored at 4°C. The sampling contractor (Battelle) collected a sample of each mixed core for sulfide analysis and submitted them to a testing laboratory. Also, two 4-oz bottles of each sample were frozen for possible future chemical analysis.

The samples were composited according to the scheme supplied by the COE as follows:

<u>Composite sample number</u>	<u>Core sample numbers</u>
C1	1, 3
C2	2, 4, 5, 6 (below top 4')
C3	6 (upper 4')
C4	7, 9, 11
C5	8, 10, 12, 13
C6	14, 15, 16
C7	17, 18, 19
C8	20
C9	Sequim Bay

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Equal volumes of each of the samples to be composited were placed in a stainless steel container and thoroughly mixed. Portions of each composite were taken for the following analyses: sulfides; As, Cd, Cu, Pb, Hg, and Zn; oil and grease; grain size distribution; total organic carbon; total solids and total volatile solids; organic chemicals; and bioassays. Four quarts of each composite were used for the amphipod bioassays and the remainder stored at 4°C for 30 days. Two 4-oz bottles of each composite sample were stored at -20°C for organic chemical analyses; two additional bottles of each composite sample were stored for any additional analyses.

Procedures for Chemical and Physical Analyses

Except for analyses for organic compounds, chemical and physical analyses were conducted using procedures described in EPA Technical Report EPA/CE-81-1.

Total Extractable Hydrocarbons (Oil and Grease)

Sediment was mixed with anhydrous magnesium sulfate and extracted with freon. The freon containing the extractable organic material was analyzed by infrared spectrophotometry in accordance with the instrument's operating manual.

Grain-Size Analysis

Grain-size analyses were performed to estimate percent distribution for gravel, sand, silt and clay. Approximately 25 g wet sample were sieved through 2-mm and 62-um screens. Material retained on the screens was dried at 100°C for 24 h and weighed to give "percentage of" gravel and sand, respectively. Material that passed the 62 um screens was submitted for pipet analysis to determine silt and clay.

Total Solids (TS) and Volatile Solids (VS)

For determining TS and VS, evaporating dishes were prepared by ignition for 60 min at $\geq 550^{\circ}\text{C}$ and cooling in a desiccator. The dishes were weighed to the nearest 10 mg and stored in a desiccator until needed. 25-50 g of sediment were placed in a prepared evaporating dish and weighed to the nearest 10 mg. The dishes were placed in an oven at 103°C overnight. The dishes were cooled in an individual desiccator containing fresh desiccant and subsequently weighed and the results used to determine % water and TS.

Volatile solids and ash were determined by igniting the residue from the TS analysis in an electric muffle furnace at 550°C for 60 minutes. The residue and dish were cooled in a desiccator and reweighed and results used to calculate VS and percent ash.

Analysis of Trace Metals in Sediments

Sediment subsamples were taken from the well-homogenized samples. Subsamples were removed with a spatula and placed into acid-cleaned borosilicate jars and digested in HNO_3 .

Most metals (Pb, Cu, Cd, As and Zn) were measured using graphite furnace atomic absorption (AA) spectroscopy. Mercury was measured using the cold-vapor absorption technique. The quantitation limits, based on twice the standard deviation of triplicate samples near the detection limit were 0.01 ug/g dry weight for mercury, and 0.1 ug/g for Pb, Cu, Cd, As, and Zn.

Reagent blanks were analyzed with every set of 20 samples or fewer. The concentrations in the blanks were \leq to the detection limit (Table 5). The AA was calibrated by the method of standard additions according to the manufacturer's instructions. A calibration curve was prepared each day. All samples were analyzed under conditions which gave a response in the linear range. A standard in the linear range was analyzed with every ten samples. Dilutions were prepared from commercially available (1000 mg/L) AA standards.

Precision and accuracy of the laboratory methods were demonstrated prior to analyzing samples. National Research Council of Canada (NRCC) estuarine sediment reference material was analyzed with each set of 20 or fewer samples to check the accuracy of the analysis. Sample C1 was submitted as a blind duplicate to determine precision. All quality control data are part of this report.

Analysis of Organic Compounds in Sediment

Samples were analyzed for the compounds listed in Table 2 by the procedures set forth in NOAA Technical Memorandum NMFS F/NWC 64 (MacLeod et al. 1984) with slight modification. The procedure is briefly described below.

Ten grams of wet sediment were mixed with Na_2SO_4 and extracted with dichloromethane. Hexachlorobutadiene, endosulfans, endrin, and hexachlorocyclohexanes were analyzed in a portion of the total extract by gas chromatography (GC)-electron capture detection (ECD). The remaining extract was chromatographed using silica-alumina chromatography and Sephadex LH-20 column chromatography. Samples were analyzed using capillary column GC with flame ionization (FID) and ECD for quantitation, and mass spectrometer (MS) detector for confirming identities. Phthalates were quantitated using GC/MS.

Quality control measures for analyzing organic compounds are summarized here and in Appendix I. Internal standards were added at the beginning of sample preparation to calculate the concentrations of the analytes, and in the last step prior to GC analysis to calculate the recovery of the above internal standards. The gas chromatograph was routinely calibrated to confirm that responses remained consistent throughout sample analyses. This was accomplished by analyzing a standard solution 3 times before analyzing samples and after every 4 or fewer samples. With few exceptions the responses for each compound were within $\pm 5\%$. Standard solutions have been prepared in duplicate and the concentrations for each compound was shown to be reproducible to within $\pm 5\%$.

The tables in Appendix II show previous results of analyses of samples of our reference sediment for aromatic and chlorinated compounds, for laboratory blanks (LB), and laboratory blanks with added standards (LBAS). The detection limits for aromatic hydrocarbons was about 6 ng/g and for pesticides about 1 ng/g (Appendix II, Tables 1 and 2). Each of three chemists analyzed 3 samples of a reference sediment, 1 LB and 1 LBAS or a second reference sediment. The recovery of internal standards for each

sample was commonly $\geq 50\%$ and the results were reproducible to $\pm 25\%$ (or better) for the entire sample preparation and instrumental analysis. The analytes were not detected in the LB and the added analyte standards were generally recovered at about 100%. The relative standard deviation (or coefficient of variation) for each PAH for each chemist was generally $\leq \pm 25\%$. The same parameter among the three chemists generally was $\leq \pm 25\%$. All data from analyses of samples, blanks, reference materials, replicates, are included in this report.

Biological Assays

Amphipod Bioassays

Static, ten-day amphipod (Rhepoxynius abronius) lethality bioassays of fresh and aged sediments were conducted using the protocol of Swartz et al. (1985). Assays of fresh sediments were conducted as required by the EPA interim criteria for disposal of dredged sediments at the Four-Mile Rock open-water disposal site. Testing of aged sediments was undertaken at the request of COE to evaluate possible changes in the toxicity of dredged spoils occurring after placement in an open water disposal site.

Amphipods were collected at West Beach (Bowmans Bay) on Whidbey Island, Washington. Prior to testing, the amphipods were acclimated for at least 72 hrs to 15°C seawater (26-28‰ salinity) and examined microscopically to confirm taxonomic identity and allow removal of those showing physical damage from collection. Test sediments were stored at 4°C and assayed within 10 days of collection.

Bioassays were conducted in 1-L glass beakers containing 175 mL sediment to create a 2 cm-deep layer. Before testing, the interstitial salinity of each sediment was determined and, since all were $> 25\%$, no procedural adjustment was necessary. Beakers were then filled with 775 mL of charcoal-

and particulate (3 μ m)-filtered seawater (salinity 26-28‰), covered with watchglasses and placed in a 15°C waterbath. Seawater overlying the sediments was aerated without disturbing the surface sediment. Twenty-four hour lighting was maintained to discourage amphipod emergence from the sediment.

For each sediment sample tested, 20 amphipods were placed in each of 6 replicate beakers. Five beakers were not disturbed during the 10-day exposure period and used to evaluate survival. The sixth beaker was used for daily measurement of seawater pH and dissolved oxygen concentrations, and measurement of starting and ending sediment-interstitial water, Eh, salinity and pH.

For each sediment tested, an additional 6 beakers were prepared with 175 mL sediment and placed in a covered, ambient temperature (10-12°C) seawater bath for aging. Each beaker was provided with flowing seawater at a rate of 3 L/hr without disturbing or resuspending the sediment. After 35 days the beakers were transferred to a 15°C waterbath and static, 10 day amphipod bioassays were conducted as described above.

At the completion of each bioassay, the proportion of surviving amphipods was determined in each beaker. Differences in survival among the treatment groups was statistically evaluated using analysis of variance (ANOVA) and the Newman-Keul multiple comparison test.

Bacterial Bioluminescence (Microtox) Assay

Bacterial bioluminescence assays were conducted on organic extracts of fresh and aged (35 days in flowing seawater) sediments as described by Schiewe et al. (1985). Briefly, standardized dichloromethane extracts of each test sediment were prepared as outlined above (see chemistry section) and transferred (solvent-exchanged) to 100% ethanol. The extracts were stored at -20°C until tested.

For determination of EC_{50} s (the concentration of extract causing a 50% reduction in light emitted), 4 concentrations of extract and a saline blank were tested in duplicate. All dilutions were prepared in a saline solution containing 2% NaCl in charcoal-filtered, double-distilled water. To begin testing, equal volumes of diluted extracts (or saline) and suspensions of the bioluminescent bacterium Photobacterium phosphoreum were mixed and placed in a temperature-controlled incubation block at 15°C. Working solutions of test bacteria were prepared daily by reconstituting a lyophilized suspension of bacteria (Microtox reagent, Beckman Instruments, Carlsbad, CA) in sterile, charcoal-filtered, double-distilled water. Bioluminescence was monitored at a wavelength of 491 nm at 0-time and after 5, 15 and 30 min of exposure using a Model 2055 Microtox Toxicity Analyzer (Beckman Instruments). For each sediment extract tested, a parallel solvent-only assay was run to allow adjustment of results for the contribution of the ethanol carrier.

Estimates of the EC_{50} s were calculated using linear regression analyses. The percent inhibition of light emitted at each test concentration and time point were converted to a gamma value which has been defined as the ratio of light lost to light remaining. The gamma values were normalized for natural decline in light production over time and adjusted for the contribution of the solvent vehicle. The natural log gamma was regressed on the natural log of extract concentration and the EC_{50} was calculated from the regression equation. A mathematical procedure based on Fieller's Theorem was used to calculate a 95% confidence interval for each estimate of the EC_{50} .

RESULTS

Physical Tests and Chemical Analyses

The concentrations of sulfides in the individual core samples ranged from 38 to 620 ug/g wet weight (Table 3). Particle size distribution data

for the composite sediment samples are included in Table 4. Sediments C1, C2, and C4 were characterized by a high proportion of sand, while sediments C3, C5, C6, C7, C8 and C9 contained a high percentage of silt and clay. The concentrations of metals, sulfides and selected physical characteristics for the composited sediment samples are shown in Table 5. Sediments C3, C5, C6, C7, C8 and C9 were characterized by relatively high levels of As, Cu and sulfides. Concentrations were highest in C8. Concentrations of oil and grease, and the remaining metals analyzed were also highest in C8.

Quality control (QC) for metals analyses included results from laboratory blanks (BL) and sediment analysis with and without added standards (spiked samples) (Table 6). The recoveries for As, Cd, Cu, Pb and Zn ranged from 75 to 115% and the maximum variation was $\pm 20\%$ of the mean. The concentrations of Cd and Cu measured in the BCSS-1 reference sediments and As, Cd and Cu in MESS-1 were within the 95% tolerance levels (Table 7). The concentrations of As, Pb, Zn and Cr in BCSS-1 and of Pb, Zn and Cr in MESS-1 were slightly outside the 95% tolerance level. If desired, the data in Table 6 can be used to correct the concentrations of metals listed in Table 4 for analytical bias.

The guidelines for quality assurance for these sediment analyses included (a) the recovery of internal standards added to each sample should be $\geq 50\%$ with reproducibility of $\pm 25\%$ or better; (b) analytes should not be present in laboratory blank samples at or above the limits of detection (generally 5 ng/g for AHs and 1 ng/g for CHs); (c) standards added to laboratory blanks and analyzed as a sample would be recovered at $\geq 50\%$ with reproducibility of $\pm 25\%$ or better; and (d) the concentrations of AHs and CHs determined for a reference sediment should be $\geq 50\%$ of the stated value with reproducibility of $\pm 25\%$ or better.

The concentrations of organic chemicals and corresponding QA data, are included in Tables 8-22. The concentrations of AHs and CHs in laboratory blanks (LB), laboratory blanks with added standards (LBAS), and reference sediment and the recovery of internal standards were generally within acceptable limits (Tables 8 and 16). The detection limits for AHs were generally <2 ppb and for CHs generally <0.5.

The concentrations of AHs in C1 and C2 were similar to those in C9, (Sequim Bay), whereas AH concentrations in C3, C4, C5, C6, C7 were somewhat higher than in C9 (Tables 8 and 9). The highest concentrations of AHs were measured in C8. The concentrations of PCBs were relatively low in C1 through C7, but somewhat higher than the Sequim Bay sediment (2.7 ppb). The concentrations were highest in C8 (3900 ppb, Tables 9, 10). Chlorinated pesticides were generally not detected (detection limits were generally less than 1 ppb). The main exceptions were the concentrations of o,p-DDT and p,p-DDT in C7, (42 and 22 ppb, respectively, Tables 11, 12).

The concentrations of phthalates, except bis(2-ethylhexyl)phthalate (DEHP), were generally <20 ppb (Tables 14-16). The concentrations of DEHP in the Duwamish samples ranged from 120 ppb to 2800 ppb compared to 100 ppb in the Sequim samples and 33 and 35 ppb in the 2 blank samples. The higher concentrations of DEHP in the Duwamish sediments may have been due, in part, to phthalates from the plastic pipe used for sample collection.

The concentrations of the other compounds listed in the Four-Mile Rock Interim Criteria are included in Tables 17-19. Most of these chemicals were not detected. Limits of detection were generally <10 ppb. Dichlorobenzenes were present in the laboratory blank samples at concentrations ranging from 6.7 to 25 ppb, therefore, a concentration of >40 ppb was adopted as a real value (approximately two times the concentration in the blanks). This 40 ppb

value was exceeded in sample C2 (94 ppb), possibly due in part to laboratory contamination. Hexachlorobutadiene (HCBD), endosulfans, endrin, and hexachlorocyclohexanes were not detected (detection limits were generally <2 ppb, Tables 20-22).

Amphipod Bioassays

The results of 10-day amphipod bioassays of fresh and aged Duwamish Waterway sediments are summarized in Table 23. Selected physical properties of the sediments and their interstitial water (i.e., pH, salinity, mean Eh) are shown in Appendices III and IV. Dissolved oxygen concentrations were above 8 mg/L during all bioassays.

Amphipod survival in the fresh sediments ranged from a high of 96% in Duwamish Waterway sediments C1 and C2, to a low of 39% in Duwamish Waterway sediment C8. Survival was significantly different (lower, $P=0.05$) in Duwamish Waterway sediments C6, C7, C8, and the Sequim Bay fine-grain control sediment when compared to that in the Bowman Bay control sediment. Moreover, amphipod survival in sediments C6, C7, and C8 was significantly different (lower, $P=0.05$) than that in the Sequim Bay sediment.

In contrast to the differential survival observed in amphipod bioassays of fresh sediments, no significant differences were observed in survival of amphipods exposed to any of the aged sediments. Percent survival ranged from a high of 97% to a low of 85%; 94% survival was observed in the aged Bowman Bay native sediment.

Bacterial Bioluminescence Bioassays

Results of bacterial bioluminescence assays of organic extracts of fresh and aged sediments are summarized in Table 24. The estimated 15 min EC_{50} s of extracts of the Duwamish Waterway sediments ranged from 0.06 to 0.45 $\mu\text{L/mL}$, and were all significantly different ($P=0.05$) than the extract

of Bowman Bay sediment ($EC_{50} = 3.29 \text{ uL/mL}$). Despite this narrow range of toxicities among the extracts of Duwamish Waterway sediment, statistical analyses (Spearman Rank Correlation) indicated a significant association between 15-min EC_{50} s and the sum of the measured aromatic hydrocarbons ($r_s=0.862$, $P=0.02$).

The estimated 15-min EC_{50} s of extracts prepared from aged sediments ranged from a low of 0.04 uL/mL for sediment C-8 to a high of 0.61 uL/mL for sediment C2. Extracts of sediments C1, C2 and the Bowman Bay sediment all showed a decline in toxicity after aging, while extracts of sediments C4, C5 and C6 showed increased toxicity. As was the case with extracts of fresh sediments, the extracts of the aged Duwamish Waterway sediments were all significantly ($P=0.05$) more toxic than the extract of aged Bowman Bay control sediment.

DISCUSSION

Chemistry

The concentrations of chemicals in Duwamish Waterway sediments C1 through C7 were generally below the criteria set for disposal of dredged materials at Four-Mile Rock. In contrast, the concentrations of most organic chemicals and metals in C8 exceeded these criteria. Exceptions were the concentrations of arsenic which exceeded the criteria by about 6% and 18% in sediments C5 and C7, respectively. However, the As concentration in Sequim Bay sediment (C9) exceeded the criteria by about 30%. It should be noted that different analytical methods could give rise to considerable differences in results of As analysis. The criteria are based on data from another laboratory and most likely the analytical methods used for As were not the same as that used for these samples. The concentrations for As in reference materials analyzed with these samples (Table 7) were 31%

and 4% higher than the published mean concentration. The concentration of DDT in C7 (29 ppb) exceeded the criteria (8 ppb). It should be noted that 29 ppb for DDT, a chemical generally regarded as having similar toxicity to PCBs, is a relatively low concentration and may not be environmentally significant.

Amphipod Bioassays

Results of amphipod bioassays indicated three of the eight Duwamish Waterway sediments (C6, C7 and C8) and the Sequim Bay sediment were significantly more toxic than the Bowman Bay native control sediment. Since a high proportion of clay and silt are known to adversely affect amphipod survival (Swartz et al. 1985), the fine-grain nature of all of these sediments probably contributed to the observed toxicity. However, sediments C6, C7 and C8 were also significantly more toxic than the Sequim Bay sediment. Thus grain size alone does not appear to account for all the toxicity of the Duwamish Waterway sediments, and other factors (e.g., concentrations of chemical contaminants, sulfides) must be considered.

An interesting finding of these studies was the apparent reduction in toxicity which occurred when the Duwamish Waterway sediments were aged in flowing seawater for 35 days and then retested in amphipod bioassays. This reduced toxicity may, however, be an artifact of the test methodology. During aging, a thin (ca. 2 mm) crust of reddish-brown material formed at the sediment-seawater interface, probably as a result of the activities of chemotrophic bacteria. When amphipods were introduced into the beakers at the start of bioassays, they tended to remain on the sediment crust and rarely burrowed beneath the surface. This modified burial behavior greatly reduced sediment-amphipod contact and may alone explain the increased survival. These results suggest the limited usefulness of this method of laboratory

aging as a means of predicting possible changes in sediment toxicity in the environment and further research is needed.

Bacterial Bioluminescence Bioassays

The results of bacterial bioluminescence assays of organic extracts indicated significantly greater toxicity associated with each of the Duwamish Waterway sediments when compared to Bowman Bay reference sediment. Moreover, differences in toxicity among Duwamish Waterway sediments were significantly correlated with the concentrations of aromatic hydrocarbons.

The greater toxicity of Duwamish Waterway sediments compared to Bowman Bay sediment was also supported by bioluminescence assays of aged sediments. All extracts of Duwamish Waterway sediments were significantly more toxic than that of the Bowman Bay sediment. Noteworthy were the apparent changes in toxicity produced by the aging process; however, additional data, including chemical analyses, would be needed to judge the significance of these changes.

CONCLUSIONS

Results of chemical analyses and amphipod bioassays indicate Duwamish Waterway sediment C1, C2, C3, C4 and C5 met the criteria for disposal at the Four-Mile Rock disposal site. In contrast, sediment C8 exceeded the disposal criteria based on both high levels of chemical contaminants and significant mortality in amphipod bioassays. Sediments C6 and C7, while containing concentrations of chemical contaminants generally lower than the disposal criteria, produced significant mortality in amphipod bioassays. Results of bacterial bioluminescence (Microtox) analyses also suggested sediments C6, C7 and C8, as well as C3 and C5, were toxic.

REFERENCES

- EPA/COE Technical committee on criteria for dredged and fill material,
EPA Technical Report EPA/CE-81-1 (1981).
- MacLeod, W.D., Jr., D.W. Brown, A.S. Friedman, O. Maynes, and R. Pearce.
1984. Standard analytical procedures of the NOAA National Analytical
Facility, 1984-5: Extractable toxic organic compounds, NOAA Tech. Memo
NMFS F/NWC6-64, 100 p.
- Schiewe, M.H., E.G. Hawk, D.I. Actor, and M.M. Krahn.
1985. Use of a bacterial bioluminescence assay to assess toxicity
of contaminated marine sediments. Can. J. Fish. Aquat. Sci. 42
(In press, scheduled July 1985).
- Swartz, R.C., W.A. DeBen, J.K.P. Jones, J.O. Lamberson and F.A. Cole.
1985. Phoxocephalid amphipod bioassay for marine sediment toxicity,
pp. 284-307 in Aquatic Toxicology and Hazard Assessment: Seventh
Symposium. ASTM 854 R.D. Cardwell, R. Pudy and R.C. Bakner, eds.
American Society for Testing and Materials, Philadelphia, PA.

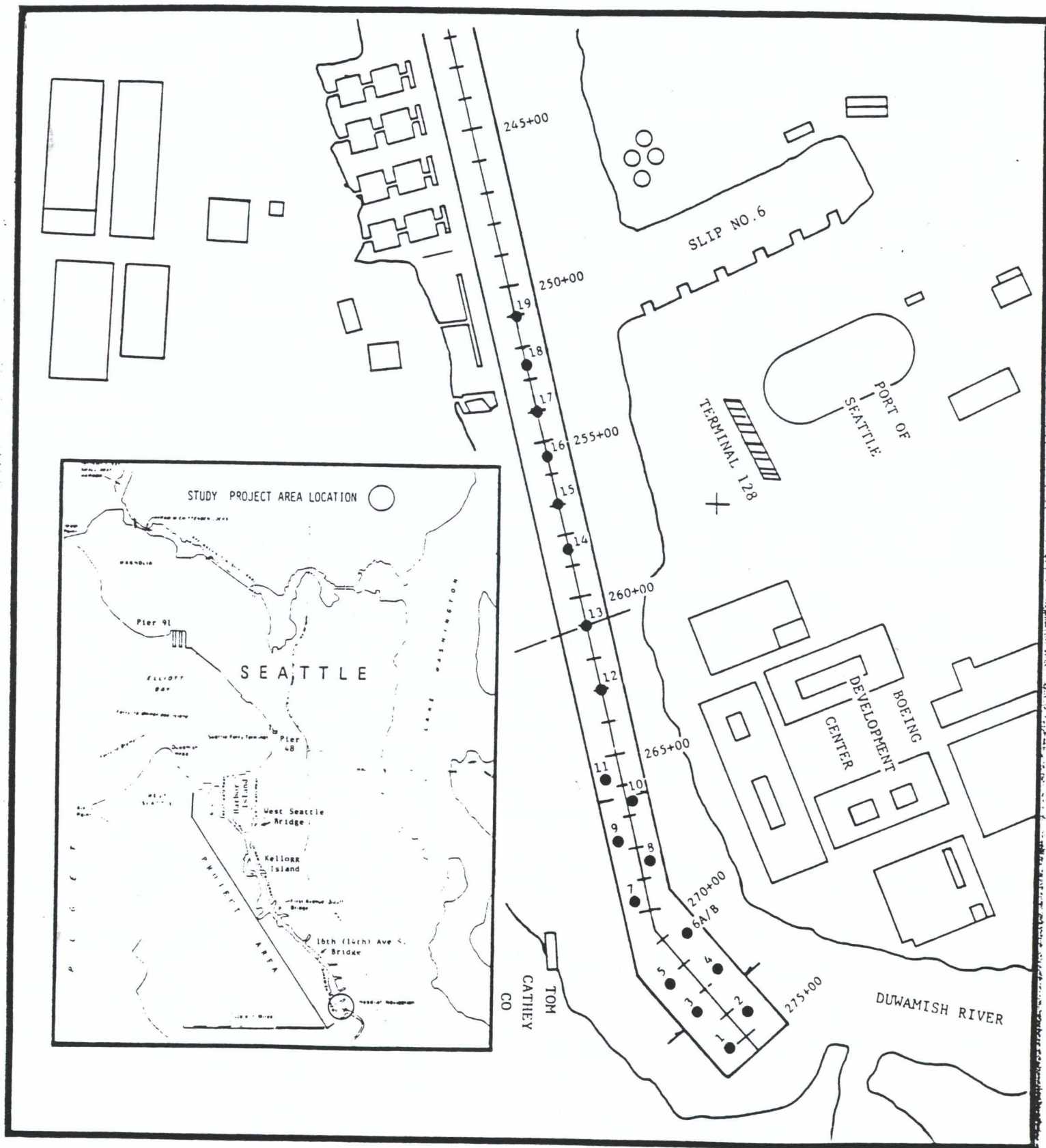


Figure1. Sediment Sampling Station Locations for Dredged Material Characterization.

TABLE 1. Sampling locations in the Duwamish Waterway and the compositing scheme.

Core Sample No.	Station Designation	Offset	Length of core from surface	Sediment type in 1984	Composite No.
1	274 + 50	70' East	4'	sand	1
2	275 + 00	70' West	4'	sand	2
3	273 + 00	70' East	4'	sand	1
4	273 + 50	70' West	6'	sand	2
5	272 + 00	70' West	6'	sand	2
6 upper	271 + 50	70' East	4'	sand	3
6 bottom	271 + 50	70' East	4'-8'	sand	2
7	270 + 00	40' West	6'	sand	4
8	269 + 00	40' East	5'	silt & sand	5
9	268 + 00	40' West	6'	sand	4
10	266 + 00	40' East	6'	silt & sand	5
11	265 + 00	40' West	6'	sand	4
12	263 + 00	CL ^a	4'	silt & sand	5
13	261 + 00	CL	4'	silt & sand	5
14	258 + 50	CL	5'	silt	6
15	257 + 00	CL	4'	silt	6
16	255 + 00	CL	3'	silt	6
17	254 + 00	CL	5'	silt	7
18	252 + 50	CL	5'	silt	7
19	251 + 00	CL	4'	silt	7
20	60 + 00	75' East	5'	silt	8
Grab	Sequim Bay				9

^a CL = Center line

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T-91

Table 2. Organic chemicals to be analyzed in Duwamish sediments and clams from bioaccumulation studies.

Column 1	Column 2
naphthalene	alpha hexachlorocyclohexane
acenaphthylene	beta hexachlorocyclohexane
2-methylnaphthalene	delta hexachlorocyclohexane
1-methylnaphthalene	bis (2-chloroethyl) ether
biphenyl	N-nitrosodi-n-propylamine
2,6-dimethylnaphthalene	nitrobenzene
acenaphthene	trimethylcyclohexenone
fluorene	bis (2-chloroethoxy) methane
phenanthrene	2,6-dinitrotoluene
anthracene	2,4-dinitrotoluene
1-methylphenanthrene	1,2-diphenylhydrazine
dimethylphenanthrene	azobenzene
fluoranthene	benzidine
pyrene	3,3'-dichlorobenzidine
benz[a]anthracene	1,2-dichlorobenzene
chrysene	1,3-dichlorobenzene
benzo[b]fluoranthene	1,4-dichlorobenzene
benzo[k]fluoranthene	4-chlorophenyl phenyl ether
benzo[e]pyrene	4-bromophenyl phenyl ether
benzo[a]pyrene	endrin
perylene	isophorone
indeno[1,2,3-cd] pyrene	alpha-endosulfan
dibenz[a,h]anthracene	beta-endosulfan
benzo[ghi]perylene	toxaphene
hexachlorobenzene	
lindane (gamma-BHC)	
heptachlor	
aldrin	
heptachlorepoide	
alpha-chlordane	
trans-nonachlor	
dieldrin	
mirex	
o,p'-DDE	
p,p'-DDE	
o,p'-DDD	
p,p'-DDD	
o,p'-DDT	
p,p'-DDT	
dichlorobiphenyls (b)	
trichlorobiphenyls	
tetrachlorobiphenyls	
pentachlorobiphenyls	
hexachlorobiphenyls	
heptachlorobiphenyls	
octachlorobiphenyls	
nonachlorobiphenyls	

a The compounds in column 1 are routinely analyzed by NAF and are associated with the QA detailed in the report and in attachment 1. The compounds in column 2 are not routinely analyzed and QA for these compounds is not as extensive as that for column 1 chemicals. The concentrations of the compounds in column 2 were calculated using standards obtained from EPA or Foxboro Analabs. Recovery data were not determined for the compounds in column 2.

b The concentrations of the individual chlorinated biphenyls can be added to give a concentration of total PCB's.

Table 3. Concentrations of sulfides in individual sediment samples.

sulfide
(ug/g wet weight)

station 1	38
station 2	140
station 3	210
station 4	240
station 5	93
station 7	360
station 8	450
station 9	150
station 10	270
station 11	280
station 12	370
station 14	270
station 16	440
station 19	320
station D-6	230
station D-13	370
station D-15	250
station D-17	330
station D-18	540
station D-20	620
station D-6 lower	83
station D-6 upper	300

1-2 {

Table 4. Particle size distribution (% by weight).

			C 1	C 1 ^a	C 2	C 3	C 4
class	microns	Phi (Ø)					
gravel	> 2000	> -1	4.1	1.7	4.5	5.7	6.4
very coarse sand	2000-850	-1 to +0.2	10.6	10.0	14.1	4.8	2.2
coarse sand	850-500	+0.2 to +1	26.1	42.6	30.7	7.9	11.9
medium sand	500-250	+1 to +2	36.8	21.8	29.8	11.8	37.0
fine sand	250-125	+2 to +3	7.3	8.5	8.6	18.8	16.8
very fine sand	125-62	+3 to +4	2.0	2.0	2.4	13.9	9.1
coarse silt	62-45	+4 to 4.7	< 1.0	< 1.0	< 1.0	2.6	2.9
medium silt - clay	< 45	< 4.7	13.1	13.4	9.9	34.5	13.7

^a Submitted as a blind duplicate.

Table 4. (cont.)

T-41

			C5	C6	C7	C8	C9
class	microns	Phi (Ø)					
gravel	> 2000	> -1	2.9	< 1.0	< 1.0	5.1	< 1.0
very coarse sand	2000-850	-1 to +0.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
coarse sand	850-500	+0.2 to +1	2.5	1.2	< 1.0	< 1.0	< 1.0
medium sand	500-250	+1 to +2	12.4	10.3	7.0	< 1.0	4.0
fine sand	250-125	+2 to +3	16.8	25.8	21.5	2.1	6.0
very fine sand	125-62	+3 to +4	19.7	17.8	17.7	5.2	16.7
coarse silt	62-45	+4 to 4.7	3.4	5.0	4.6	2.8	4.5
medium silt - clay	< 45	< 4.7	42.3	39.9	49.2	84.8	68.8

Table 5. Concentrations of metals and sulfides and selected physical characteristics for sediment samples (dry weight).

	C 1 4/19/85	^a C 1 4/19/85	C 2 4/19/85	C 3 4/19/85	C 4 4/19/85
oil and grease (ug/g)	280	190 ^b 210	260	1600	150
sulfide (ug/g)	63	150	70	310	170
total organic carbon (%)	0.36	0.42	0.63	3.5	2.8
total solids (%)	76	75 ^b 76	74	50	63
total volatile solids (%)	2.6	2.5 ^b 2.5	3.1	11	7.2
arsenic (ug/g)	8.6	8.7	12	17	14
cadmium (ug/g)	0.13	0.13	0.15	0.45	0.26
copper (ug/g)	14	15	16	32	22
lead (ug/g)	9.4	7.8	8.9	20	14
zinc (ug/g)	57	58	57	91	71
mercury (ug/g)	0.01	0.01	0.01	0.04	0.02

^a Submitted as a blind duplicate.

^b The bracket () indicates data from duplicate analysis of one sample digest.

Table 5. (cont.)

T-91

	C 5 4/19/85	C 6 4/19/85	C 7 4/19/85	C 8 4/19/85	C 9 4/19/85	blank analysis	blank analysis
oil and grease (ug/g)	120	170	360	3000	< 150	-	-
sulfide (ug/g)	190 220] a	390	360	960	410	-	-
total organic carbon (%)	2.1	2.3	1.8	2.2	1.4	-	-
total solids (%)	56 56]	54	60	50	37	-	-
total volatile solids (%)	8.2 8.1]	8.2	8.1	8.7	7.6	-	-
arsenic (ug/g)	18	17	18 22]	34	22	< 0.005	< 0.005
cadmium (ug/g)	0.42	0.35	0.38 0.41]	3.1	0.64	0.0002	0.0002
copper (ug/g)	32	32	35 35]	120	35	< 0.02	< 0.02
lead (ug/g)	17	17	25 22]	160	12	0.003	0.004
zinc (ug/g)	84	79	87 92]	270	93	0.14	0.16
mercury (ug/g)	0.04	0.07	0.05 0.05]	0.42	< 0.03	-	-

a The bracket (]) indicates data from duplicate analysis of one sample digest.

Table 6. Recovery of metals from sediments with added standards (samples spiked to give 0.4 mg/L in final solution).

composite C-8	sample wt. (g)	spiked sample wt. (g)	concentration in sample solution (mg/l)	theoretical concentration in spiked sample solution (mg/l)	measured concentration in spiked sample solution (mg/l)	% recovery
arsenic	2.0461	2.1438	0.27	0.68	0.78	114.7
cadmium	2.0461	2.1438	0.0041	0.4041	0.37	92.5
copper	2.0461	2.1438	0.47	0.89	0.86	96.6
lead	2.0461	2.1438	0.24	0.65	0.68	104.6
zinc	2.0461	2.1438	1.80	2.28	2.13	93.4
a marine sediment						
arsenic	2.1353	2.0207	0.45	0.83	0.62	74.7
cadmium	2.1353	2.0207	0.0241 0.0228] a	0.422	0.364	86.3
copper	2.1353	2.0207	0.76	1.12	1.13	100.9
lead	2.1353	2.0207	0.24	0.63	0.54	85.7
zinc	2.1353	2.0207	1.25	1.58	1.57	99.4

a The bracket (]) indicates data from duplicate analysis of one sample digest.

Table 7. Concentrations of metals in standard reference materials.^a

metal	BCSS-1 certified value (95% tolerance level)	BCSS-1 analyzed	MESS-1 certified value (95% tolerance level)	MESS-1 analyzed
arsenic (ug/g)	11.1 ± 1.4	14] ^b 15]	10.6 ± 1.2	10.1 11.9
cadmium (ug/g)	.25 ± 0.04	0.29] 0.29]	.59 ± 0.10	0.47 0.51
copper (ug/g)	18.5 ± 2.7	16.8] 16.9]	25.1 ± 3.8	22.8 23.5
lead (ug/g)	22.7 ± 3.4	17.3] 16.9]	34.0 ± 6.1	20.1 20.6
zinc (ug/g)	119. ± 12.	84.6] 86.9]	191. ± 17.	161. 156.
chromium (ug/g)	123 ± 14	93.8] 95.5]	71. ± 11.	57. 56.

^a National Research Council of Canada certified marine sediment reference materials.

^b The bracket (]) indicates a duplicate instrumental analysis of a sample digest.

Table 8. Concentrations of aromatic hydrocarbons in sediment samples, ng/g (ppb) dry weight. ^{a,b}

	C 1		C 1 ^c		C 2		C 3		C 4		C 5	
	47-227		47-231		47-237		47-238		47-239		47-240	
naphthalene		2.6		29		71		11		5.8		12
2-methylnaphthalene		5.5		61		110		13		2.8		14
1-methylnaphthalene		5.1		53		36		26		2.8		17
biphenyl	<	1.8	<	1.9		2.7		7.4	<	2.2		6.8
2,6-dimethylnaphthalene		3.5		25		22		11		4.4		7.9
acenaphthylene -d	<	1.9	<	1.6	<	1.9	<	3.9	<	2.3	<	1.7
acenaphthene	<	1.9	<	1.6	<	1.9	<	3.9	<	2.3		9.4
fluorene	<	1.7	<	1.8		2.6	<	3.5	<	2.1	<	2.1
phenanthrene		23		31		54		150		80		120
anthracene		2.1		6.1		7.6		15		6.5		13
1-methylphenanthrene	<	1.3		15		10		32		9.4		24
fluoranthene		37		35		64		220		110		160
pyrene		31		29		52		230		120		160
benz[a]anthracene		7.4		6.2		17		100		33		140
chrysene		21		22		36		260		57		110
benzofluoranthene-e		7.4		7.5		18		150		29		76
benzo[e]pyrene		5.5		9.8		7.7		86		28		51
benzo[a]pyrene		5.6		5.6		7.2		61		26		49
perylene		20		21		21		84		33		60
indeno[1,2,3-cd]pyrene -f	<	3.0	<	2.4		4.4		44		21		29
dibenz[a,h]anthracene	<	3.0		9.5	<	2.9	<	7.0	<	3.0	<	3.3
benzo[ghi]perylene -f		4.5	<	2.4		12		93		42		92
recovery of naphthalene-d8		100 %		80 %		78 %		78 %		71 %		72 %
recovery of acenaphthene-d10		93 %		84 %		85 %		88 %		92 %		80 %
recovery of perylene-d12		47 %		52 %		60 %		54 %		78 %		58 %
sample weight, g		10.11		10.06		10.26		10.21		10.09		10.29
% dry weight		74.51		77.33		73.60		48.85		60.75		52.89

- a The concentrations of compounds above biphenyl were calculated using naphthalene-d8 as the internal standard; the concentrations of compounds below pyrene were calculated using perylene-d12; and the remainder were calculated using acenaphthene-d10.
- b The "less than" symbol (<) indicates that the chemical was not detected and that the value is the detection limit.
- c Duplicate analysis.
- d Acenaphthylene was calculated using acenaphthene response.
- e The concentrations of the benzofluoranthenes are reported as the sum of the concentrations of the -b, -j and -k isomers.
- f Indeno[1,2,3-cd]pyrene and benzo[ghi]perylene were calculated using dibenz[a,h]anthracene response.

Table 9. Concentrations of aromatic hydrocarbons in sediment samples. ng/g (ppb) dry weight. ^{a,b}

	T-91		C	
	C 6	C 7	C 8	C 9
	47-241	47-225	47-226	47-242
naphthalene	6.0	8.3	99	< 3.0
2-methylnaphthalene	9.2	9.7	140	9.1
1-methylnaphthalene	21	13	83	7.4
biphenyl	14	4.3	29	7.9
2,6-dimethylnaphthalene	12	11	190	9.1
acenaphthylene -d	< 3.6	< 1.7	2400	< 37
acenaphthene	< 3.6	23	100	< 2.8
fluorene	4.8	14	91	< 2.5
phenanthrene	97	190	560	40
anthracene	7.4	26	210	< 2.3
1-methylphenanthrene	13	27	170	4.4
fluoranthene	170	300	1100	53
pyrene	160	270	1200	35
benz[a]anthracene	50	180	590	< 2.7
chrysene	120	250	1400	16
benzofluoranthenes-e	59	200	720	9.1
benzo[e]pyrene	56	100	490	10
benzo[a]pyrene	44	95	400	8.3
perylene	77	150	540	35
indeno[1,2,3-cd]pyrene -f	19	59	170	6.6
dibenz[a,h]anthracene	< 5.9	< 4.3	42	< 3.3
benzo[ghi]perylene -f	80	67	180	8.3
recovery of naphthalene-d8	77 %	87 %	98 %	70 %
recovery of acenaphthene-d10	80 %	87 %	94 %	77 %
recovery of perylene-d12	53 %	42 %	49 %	65 %
sample weight, g	10.41	9.97	9.99	10.50
% dry weight	52.85	54.72	48.72	38.72

- a The concentrations of compounds above biphenyl were calculated using naphthalene-d8 as the internal standard; the concentrations of compounds below pyrene were calculated using perylene-d12; and the remainder were calculated using acenaphthene-d10.
- b The "less than" symbol (<) indicates that the chemical was not detected and that the value is the detection limit.
- c Sample 47-226 was quantitated by GC/MS.
- d Acenaphthylene was calculated using acenaphthene response.
- e The concentrations of the benzofluoranthenes are reported as the sum of the concentrations of the -b, -j and -k isomers.
- f Indeno[1,2,3-cd]pyrene and benzo[ghi]perylene were calculated using dibenz[a,h]anthracene response.

Table 10. Concentrations of aromatic hydrocarbons in blank samples and Duwamish III reference sediment, ng/g (ppb) dry weight. ^{a,b}

	^c blank		^d spk. sed.	DUW III	^e X (N-9)	^f CV
	47-232	47-244	47-243	47-230		
naphthalene	< 1.7	< 1.9	97	280	360	56
2-methylnaphthalene	< 1.7	< 1.9	91	140	170	18
1-methylnaphthalene	< 1.7	< 1.9	110	90	120	33
biphenyl	< 1.7	< 1.6	94	27	41	19
2,6-dimethylnaphthalene	< 1.6	< 1.6	91	85	75	14
acenaphthylene -g	< 1.8	< 1.7	-	< 1.9	-	-
acenaphthene	< 1.8	< 1.7	92	320	350	14
fluorene	< 1.6	< 1.6	100	270	370	24
phenanthrene	< 1.5	< 1.5	100	2000	2400	12
anthracene	< 1.4	< 1.4	95	440	810	72
1-methylphenanthrene	< 1.4	< 1.4	100	180	220	14
fluoranthene	5.7	< 1.4	98	3000	3600	8
pyrene	< 1.4	< 1.4	98	3500	3900	10
benz[a]anthracene	< 1.6	< 1.7	120	1800	1800	17
chrysene	< 1.8	< 1.8	100	2900	3000	17
benzofluoranthenes-h	4.6	< 1.2	-	3000	-	-
benzo[e]pyrene	< 1.7	< 1.7	110	1800	1900	16
benzo[a]pyrene	< 1.7	< 1.7	95	1800	2000	15
perylene	< 1.8	< 1.7	97	580	640	19
indeno[1,2,3-cd]pyrene -i	< 1.9	< 2.1	-	1200	-	-
dibenz[a,h]anthracene	< 1.8	< 2.1	78	330	340	21
benzo[ghi]perylene -i	< 1.8	< 2.1	-	980	-	-
recovery of naphthalene-d8	93 %	64 %	80 %	90 %	80 %	9
recovery of acenaphthene-d10	90 %	71 %	96 %	90 %	93 %	5
recovery of perylene-d12	77 %	61 %	81 %	65 %	71 %	13
sample weight, g	-	-	-	10.15		
% dry weight	-	-	-	52.23		

- a The concentrations of compounds above biphenyl were calculated using naphthalene-d8 as the internal standard; the concentrations of compounds below pyrene were calculated using perylene-d12; and the remainder were calculated using acenaphthene-d10.
- b The "less than" symbol (<) indicates that the chemical was not detected and that the value is the detection limit.
- c Blank analysis.
- d The percent recoveries of analyte standards added to a duplicate of C 2 were obtained after subtracting the concentrations of the analytes in the sediment.
- e Mean for previously analyzed Duwamish III reference sediment.
- f Coefficient of variation for previously analyzed Duwamish III reference sediment.
- g Acenaphthylene was calculated using acenaphthene response.
- h The concentrations of the benzofluoranthenes are reported as the sum of the concentrations of the -b, -j and -k isomers.
- i Indeno[1,2,3-cd]pyrene and benzo[ghi]perylene were calculated using dibenz[a,h]anthracene response.

Table 11. Concentrations of chlorinated compounds in sediment samples, ng/g (ppb) dry weight. ^{a,b}

	C 1		C 1 ^c		C 2		C 3		C 4		C 5	
	47-227		47-231		47-237		47-238		47-239		47-240	
hexachlorobenzene	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5
lindane (gamma-BHC)	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5
heptachlor	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5
aldrin	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5
heptachlorepoxyde	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5
alpha-chlordane	<	0.5	<	0.5	<	0.5		0.7	<	0.5	<	0.5
trans-nonachlor	<	0.5	<	0.5	<	0.5		1.0	<	0.5	<	0.5
dieldrin	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5
mirex	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5
o,p'-DDE	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5
p,p'-DDE	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5
o,p'-DDD	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5
p,p'-DDD -d		0.6		0.6		0.9		3.9		0.6		1.3
o,p'-DDT	<	0.5	<	0.5	<	0.5	<	0.9	<	0.5	<	0.5
p,p'-DDT	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5	<	0.5
dichlorobiphenyls	<	0.89	<	1.1	<	0.8	<	1.2	<	1.0		2.2
trichlorobiphenyls		3.3		3.0		7.7		3.6	<	0.5		20
tetrachlorobiphenyls		6.1		6.6		12		6.0		2.7		27
pentachlorobiphenyls		8.2		10		9.4		14		7.4		19
hexachlorobiphenyls		3.9		4.6		4.1		5.5		2.5		5.7
heptachlorobiphenyls		0.96		0.7		1.6		1.7		0.7		1.0
octachlorobiphenyls	<	0.50	<	0.5		0.9		0.6	<	0.5		0.6
nonachlorobiphenyls	<	0.5	<	0.5		2.3	<	0.5	<	0.5	<	0.5
toxaphene -e	<	50	<	70	<	100	<	120	<	80	<	120
recovery of 1,2,3-trichlorobenzene	94	%	90	%	67	%	66	%	58	%	62	%
recovery of acenaphthene-d10	93	%	84	%	85	%	88	%	92	%	80	%
sample weight, g	10.11		10.06		10.26		10.21		10.09		10.29	
% dry weight	74.51		77.33		73.60		48.85		60.75		52.89	

^a The concentrations of all compounds were calculated using acenaphthene-d10 as the internal standard.

^b The "less than" symbol (<) indicates that the chemical was not detected and that the value is the detection limit.

^c Duplicate analysis.

^d Possible interfering peak at the same retention time.

^e Detection limits greater than 50 are due to the presence of PCB's in the sample extract that interfered with the analysis for toxaphene.

Table 12. Concentrations of chlorinated compounds in sediment samples, ng/g (ppb) dry weight. ^{a,b}

	C 6 47-241		C 7 47-225-c		C 8 47-226		C 9 47-242	
hexachlorobenzene	<	0.5	<	0.5		1.7	<	0.5
lindane (gamma-BHC)	<	0.5	<	0.5	<	0.5	<	0.5
heptachlor	<	0.5	<	0.5	<	0.5	<	0.5
aldrin	<	0.5	<	0.5	<	0.5	<	0.5
heptachlorepoxyde		0.6	<	0.5		4.9	<	0.5
alpha-chlordane	<	0.5	<	0.5		4.6	<	0.5
trans-nonachlor		0.8	<	0.5		3.7	<	0.5
dieldrin	<	0.5	<	0.5		5.2	<	0.5
mirex	<	0.5	<	0.5	<	0.5	<	0.5
o,p'-DDE	<	0.5	<	0.5	<	0.6	<	0.5
p,p'-DDE	<	0.5	<	0.5	<	0.5	<	0.5
o,p'-DDD	<	1.9	<	2.1	<	0.8	<	0.6
p,p'-DDD		3.2		5.6		71	<	0.5
o,p'-DDT	<	0.5		42	<	0.7	<	0.5
p,p'-DDT	<	0.5		22		0.8	<	0.5
dichlorobiphenyls	<	1.2		1.7		120	<	1.6
trichlorobiphenyls		5.4		14		530	<	0.6
tetrachlorobiphenyls		11		29		1100	<	0.6
pentachlorobiphenyls		16		41		1200		1.8
hexachlorobiphenyls		6.7		22		690		0.9
heptachlorobiphenyls		1.4		5.8		180	<	0.5
octachlorobiphenyls		1.1		1.6		44	<	0.5
nonachlorobiphenyls	<	0.5	<	0.5		9.6	<	0.6
toxaphene -d	<	130	<	50	<	1500	<	50
recovery of 1,2,3-trichlorobenzene		69 %		96 %		120 %		62 %
recovery of acenaphthene-d10		80 %		87 %		94 %		77 %
sample weight, g		10.41		9.97		9.99		10.50
% dry weight		52.85		54.72		48.72		38.72

a The concentrations of all compounds were calculated using acenaphthene-d10 as the internal standard.

b The "less than" symbol (<) indicates that the chemical was not detected and the value is the detection limit.

c The o,p'-DDT and p,p'-DDT were confirmed using GC/MS.

d Detection limits greater than 50 are due to the presence of PCB's in the sample extract that interfered with the analysis for toxaphene.

Table 13. Concentrations of chlorinated compounds in blank samples and Duwamish III reference sediment, ng/g (ppb) dry weight. ^{a,b}

	^c blank 47-232		^c blank 47-244		^d spk.sed. 47-243		DUW III 47-230	^e \bar{X} (N=9)	^f CV
hexachlorobenzene	<	0.2	<	0.2	68	%	0.8	0.6	6
lindane (gamma-BHC)	<	0.2	<	0.2	87	%	<	0.5	-
heptachlor	<	0.2	<	0.3	80	%	<	0.5	-
aldrin	<	0.2	<	0.2	86	%	<	0.5	-
heptachlorepoxyde	<	0.3	<	0.3	110	%	<	0.5	-
alpha-chlordane	<	0.2	<	0.2	91	%		0.8	29
trans-nonachlor	<	0.2	<	0.2	94	%		0.5	18
dieldrin	<	0.2	<	0.3	98	%		0.6	-
mirex	<	0.2	<	0.2	92	%	<	0.5	-
o,p'-DDE	<	0.3	<	0.4	100	%	<	0.5	-
p,p'-DDE	<	0.2	<	0.2	90	%	<	0.5	-
o,p'-DDD	<	0.4	<	0.5	100	%		4.5	-
p,p'-DDD	<	0.3	<	0.4	90	%		22	-
o,p'-DDT	<	0.3	<	0.4	96	%	<	0.5	-
p,p'-DDT	<	0.3	<	0.2	97	%		3.1	-
dichlorobiphenyls	<	1.1	<	1.1	110	%		4.8	21
trichlorobiphenyls		0.6	<	0.5	180	%		52	12
tetrachlorobiphenyls		0.5	<	0.5	140	%		200	11
pentachlorobiphenyls		3.7		1.0	80	%		370	16
hexachlorobiphenyls		1.4	<	0.3	92	%		240	17
heptachlorobiphenyls		0.2	<	0.2	77	%		64	43
octachlorobiphenyls	<	0.2	<	0.2	87	%		16	56
nonachlorobiphenyls	<	0.4	<	0.4	110	%		5.2	92
toxaphene -g	<	50	<	50	-		<	300	-
recovery of 1,2,3-trichlorobenzene	77	%	57	%	76	%	120	%	
recovery of acenaphthene-d10	90	%	71	%	96	%	90	%	
sample weight, g	-		-				10.15		
% dry weight	-		-				52.23		

a The concentrations of all compounds were calculated using acenaphthene-d10 as the internal standard.

b The "less than" symbol (<) indicates that the chemical was not detected and the value is the detection limit.

c Blank analysis

d The percent recoveries of analyte standards added to a duplicate of C 2 were obtained after subtracting concentrations of the analytes in the sediment.

e Mean for previously analyzed Duwamish III reference sediment.

f Coefficient of variation for previously analyzed Duwamish III reference sediment.

g Detection limits greater than 50 are due to the presence of PCB's in the sample extract that interfered with the analysis for toxaphene.

Table 14. Concentrations of phthalates in sediment samples, ng/g (ppb) dry weight.^{a,b}

	C 1 47-227	C 1 ^c 47-231	C 2 47-237	C 3 47-238	C 4 47-239	C 5 47-240
dimethyl phthalate	8.5	5.0	3.1	11	6.4	8.2
diethyl phthalate	4.5	2.7	1.7	4.4	1.9	2.4
diallyl phthalate	2.6	0.66	< 0.28	1.6	< 0.58	< 0.56
diisobutyl phthalate	2.8	0.67	0.89	3.5	0.84	1.8
dibutyl phthalate	13	7.3	7.2	36	13	24
dicyclohexyl phthalate	9.7	1.5	1.4	11	3.6	4.1
bis(2-ethylhexyl) phthalate	280	180	120	1000	260	500
recovery of added standards:						
dimethyl isophthalate	100 %	108 %	77 %	110 %	140 %	88 %
bis(2-ethylhexyl) isophthalate	104 %	92 %	110 %	110 %	140 %	85 %
sample weight, g	10.11	10.06	10.26	10.21	10.09	10.29
% dry weight	74.51	77.33	73.60	48.9	60.8	52.9

^a The concentrations of all compounds were calculated using bis(2-ethylhexyl) isophthalate as the internal standard, i.e. data are corrected for recovery.

^b The "less than" symbol indicates that the chemical was not detected and that the value is the detection limit.

^c Duplicate analysis.

Table 15. Concentrations of phthalates in sediment samples, ng/g (ppb) dry weight. ^{a,b}

	T-91			
	C 6	C 7	C 8	C 9
	47-241	47-225	47-226	47-242
dimethyl phthalate	11	12	4.8	11
diethyl phthalate	4.7	3.6	18	15
diallyl phthalate	< 1.6	1.5	20	29
diisobutyl phthalate	1.4	1.1	6.5	3.2
dibutyl phthalate	130	31	60	17
dicyclohexyl phthalate	6.1	5.7	65	8.8
bis(2-ethylhexyl) phthalate	580	740	2800	100
recovery of added standards:				
dimethyl isophthalate	92 %	105 %	112 %	98 %
bis(2-ethylhexyl) isophthalate	81 %	96 %	89 %	96 %
sample weight, g	10.41	9.97	9.99	10.5
% dry weight	52.85	54.72	48.72	38.72

^a The concentrations of all compounds were calculated using bis(2-ethylhexyl) isophthalate as the internal standard, i.e. data are corrected for recovery.

^b The "less than" symbol indicates that the chemical was not detected and that the value is the detection limit.

Table 16. Concentrations of phthalates in blanks, spiked sediment and Duwamish III reference sediment, ng/g (ppb) dry weight. ^{a,b}

	^c blank		^c blank	^d x	^e spk.blk.		DUW III
	47-232		47-244		47-243		47-230
dimethyl phthalate	<	3.1	3.8	3.5	140	%	13
diethyl phthalate	<	0.22	2.9	1.6	130	%	6.9
diallyl phthalate	<	0.61	< 0.29	< 0.45	130	%	< 4.4
diisobutyl phthalate	<	0.15	4.9	2.5	120	%	3.5
dibutyl phthalate		5.2	8.0	6.6	110	%	64
dicyclohexyl phthalate	<	0.11	1.5	0.81	120	%	11
bis(2-ethylhexyl) phthalate		33	35	34	120	%	670
recovery of added standards:							
dimethyl isophthalate		75 %	69 %		95 %		104 %
bis(2-ethylhexyl) isophthalate		82 %	77 %		83 %		98 %
sample weight, g	-	-	-	-	-	-	10.15
% dry weight	-	-	-	-	-	-	52.23

^a The concentrations of all compounds were calculated using bis(2-ethylhexyl) isophthalate as the internal standard, i.e. data are corrected for recovery.

^b The "less than" symbol indicates that the chemical was not detected and that the value is the detection limit.

^c Blank analysis.

^d Mean for the blank analysis (n=2).

^e The percent recoveries of analyte standards added to a duplicate of C 2 were obtained after subtracting the concentrations of the analytes in the sediment.

Table 17. Concentrations of chemicals in sediment samples, ng/g (ppb) dry weight.^{a,b}

	C 1		C 1 ^c		C 2		C 3		C 4		C 5	
	47-227		47-231		47-237		47-238		47-239		47-240	
bis (2-chloroethyl) ether	<	50	<	50	<	50	<	50	<	50	<	50
N-nitrosodi-n-propylamine	<	2.7	<	2.6	<	2.7	<	3.7 d	<	2.6 d	<	4.0
nitrobenzene	<	2.3	<	2.2	<	2.4	<	4.8	<	3.0	<	2.6
bis (2-chloroethoxy) methane	<	6.7	<	6.3	<	6.7	<	9.3 d	<	6.3 d	<	10
2,6-dinitrotoluene	<	3.0	<	2.8	<	2.6	<	5.3	<	3.3	<	2.9
2,4-dinitrotoluene	<	3.0	<	2.8	<	2.6	<	5.2	<	3.2	<	2.9
azobenzene -e	<	1.6	<	1.5	<	1.6	<	2.2	<	1.5	<	2.4
benzidine	<	2.7	<	2.5	<	3.4	<	6.7	<	4.2	<	3.7
3,3-dichlorobenzidine	<	2.3	<	2.1	<	2.2	<	3.0 d	<	2.0	<	3.2
1,3-dichlorobenzene	<	40	<	40	<	40	<	40	<	40	<	40
1,4-dichlorobenzene	<	40	<	40	<	40	<	40	<	40	<	40
1,2-dichlorobenzene	<	40	<	40	<	94	<	40	<	40	<	40
4-chlorophenyl phenyl ether	<	50	<	50	<	50	<	50	<	50	<	50
4-bromophenyl phenyl ether -f	<	-	<	-	<	-	<	-	<	-	<	-
isophorone	<	2.0	<	1.9	<	2.0	<	2.7 d	<	1.9	<	3.0
sample weight, g	10.11		10.06		10.26		10.21		10.09		10.29	
% dry weight	74.51		77.33		73.60		48.85		60.75		52.89	

a The concentrations of these compounds were calculated using hexamethylbenzene as the internal standard, i.e. the data are not corrected for recovery.

b The "less than" symbol (<) indicates that the chemical was not detected and the value is the detection limit.

c Duplicate analysis.

d Value confirmed by GC/MS.

e Azobenzene is a decomposition product of 1,2-diphenylhydrazine and was calculated using 1,2-diphenylhydrazine standard amounts.

f Samples were not analyzed for 4-bromophenyl phenyl ether.

Table 18. Concentrations of chemicals in sediment samples, ng/g (ppb) dry weight. ^{a,b}

	C 6 47-241		C 7 47-225		C 8 47-226		C 9 47-242	
bis (2-chloroethyl) ether	<	50	<	50	<	50 c	<	50 c
N-nitrosodi-n-propylamine	<	3.7	<	4.6	<	4.8	<	4.5
nitrobenzene	<	4.2	<	3.9	<	4.1	<	2.9
bis (2-chloroethoxy) methane	<	9.3	<	11	<	12	<	11
2,6-dinitrotoluene	<	4.7	<	5.1	<	5.3	<	3.2
2,4-dinitrotoluene	<	4.6	<	5.0	<	5.2	<	3.2
azobenzene -d	<	2.2	<	2.7	<	2.8	<	2.7
benzidine	<	6.0	<	4.5	<	4.7 c	<	4.1
3,3-dichlorobenzidine	<	3.0	<	3.8	<	4.0	<	3.6
1,3-dichlorobenzene	<	40	<	40	<	40 c	<	40
1,4-dichlorobenzene	<	40	<	40	<	40 c	<	40
1,2-dichlorobenzene	<	40	<	40	<	40 c	<	40
4-chlorophenyl phenyl ether	<	42	<	23	<	32	<	29
4-bromophenyl phenyl ether -e		-		-		-		-
isophorone	<	2.7	<	3.3	<	3.5	<	3.3
sample weight, g		10.41		9.97		9.99		10.50
% dry weight		52.85		54.72		48.72		38.72

a The concentrations of these compounds were calculated using hexamethylbenzene as the internal standard, i.e. the data are not corrected for recovery.

b The "less than" symbol (<) indicates that the chemical was not detected and the value is the detection limit.

c Value confirmed by GC/MS.

d Azobenzene is a decomposition product of 1,2-diphenylhydrazine and was calculated using 1,2-diphenylhydrazine standard amounts.

e Samples were not analyzed for 4-bromophenyl phenyl ether.

Table 19. Concentrations of chemicals in blank samples and Duwamish III reference sediment, ng/g (ppb) dry weight. ^{a,b}

		^c blank 47-232		^c blank 47-244		DUW III 47-230
bis (2-chloroethyl) ether	<	4.6	<	19	<	6.6
N-nitrosodi-n-propylamine	<	2.9	<	2.9	<	4.1
nitrobenzene	<	2.5	<	1.7	<	3.5
bis (2-chloroethoxy) methane	<	7.1	<	7.2	<	10
2,6-dinitrotoluene	<	3.2	<	1.9	<	4.5
2,4-dinitrotoluene	<	3.1	<	1.9	<	4.4
azobenzene -d	<	1.7	<	1.7	<	2.4
benzidine	<	2.8	<	2.7	<	4.0
3,3-dichlorobenzidine	<	2.4	<	2.3	<	3.4
1,3-dichlorobenzene	<	26	<	25	<	35
1,4-dichlorobenzene	<	22	<	22	<	30
1,2-dichlorobenzene	<	9.3	<	6.7	<	13
4-chlorophenyl phenyl ether	<	18	<	17	<	24
4-bromophenyl phenyl ether -e		-		-		-
isophorone	<	2.1	<	2.1	<	3.0
sample weight, g	-	-	-	-	-	10.15
% dry weight	-	-	-	-	-	52.23

- ^a The concentrations of these compounds were calculated using hexamethylbenzene as the internal standard, i.e. the data are not corrected for recovery.
- ^b The "less than" symbol (<) indicates that the chemical was not detected and the value is the detection limit.
- ^c Blank analysis.
- ^d Azobenzene is a decomposition product of 1,2-diphenylhydrazine and was calculated using 1,2-diphenylhydrazine standard amounts.
- ^e Samples were not analyzed for 4-bromophenyl phenyl ether.

Table 20. Concentrations of chemicals in sediment samples, ng/g (ppb) dry weight.^{a,b}

	^c		^c		^c		^c		^c	
	C 1	C 1	C 2	C 3	C 4	C 5	C 1	C 1	C 2	C 3
	47-227	47-231	47-237	47-238	47-239	47-240	47-227	47-231	47-237	47-238
hexachlorobutadiene	< 1.3	< 0.8	< 0.8	< 1.3	< 1.3	< 1.3	< 1.3	< 0.8	< 0.8	< 1.3
alpha endosulfan	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
beta endosulfan	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
endrin	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
hexachlorocyclohexanes -d	< 0.57	< 0.63	< 0.50	< 0.76	< 0.65	< 0.67	< 0.57	< 0.63	< 0.50	< 0.76
sample weight, g	10.11	10.06	10.26	10.21	10.09	10.29	10.11	10.06	10.26	10.21
% dry weight	74.51	77.33	73.60	48.85	60.75	52.89	74.51	77.33	73.60	48.85

- ^a The concentrations of these compounds were calculated using tetrachloro-m-xylene as the internal standard, i.e. the data are not corrected for recovery.
- ^b The "less than" symbol (<) indicates that a chemical was not detected and the value is the detection limit.
- ^c Duplicate analysis.
- ^d The reported detection limit is the highest detection limit of the alpha, beta, or delta isomers.

Table 21. Concentrations of chemicals in sediment samples, ng/g (ppb) dry weight. ^{a,b}

	C 6 47-241		C 7 47-225		C 8 47-226		C 9 47-242	
hexachlorobutadiene	<	1.3	<	1.9	<	10	<	1.3
alpha endosulfan	<	1	<	1	<	1	<	1
beta endosulfan	<	1	<	1	<	1	<	1
endrin	<	1	<	1	<	1	<	1
hexachlorocyclohexanes -c	<	0.70	<	0.94	<	1.4	<	0.91
sample weight, g		10.41		9.97		9.99		10.50
% dry weight		52.85		54.72		48.72		38.72

- a The concentrations of these compounds were calculated using tetrachloro-m-xylene as the internal standard, i.e. the data are not corrected for recovery.
- b The "less than" symbol (<) indicates that a chemical was not detected and the value is the detection limit.
- c The reported detection limit is the highest detection limit of the alpha, beta, or delta isomers.

Table 22. Concentrations of chlorinated compounds in blank samples and Duwamish III reference sediment, ng/g (ppb) dry weight. ^{a,b}

	^c blank 47-232		^c blank 47-244		DUW III 47-230
hexachlorobutadiene	<	1.2	<	1.0	< 1.7
alpha endosulfan	<	1	<	1	< 1
beta endosulfan	<	1	<	1	< 1
endrin	<	1	<	1	< 1
hexachlorocyclohexanes -d	<	0.71	<	0.59	< 0.73
sample weight, g	-	-	-	-	10.15
% dry weight	-	-	-	-	52.23

^a The concentrations of these compounds were calculated using tetrachloro-m-xylene as the internal standard, i.e. the data are not corrected for recovery.

^b The "less than" symbol (<) indicates that a chemical was not detected and the value is the detection limit.

^c Blank analysis.

^d The reported detection limit is the highest detection limit of the alpha, beta, or delta isomers.

Table 23. Results of 10 day amphipod (Rhepoxynius abronius) bioassays of fresh and aged Duwamish Waterway and reference sediments.

Sediment	Number surviving/number exposed	
	Fresh	Aged
C1	0.96 \pm 0.042	0.97 \pm 0.045
C2	0.87 \pm 0.091	0.96 \pm 0.042
C3	0.96 \pm 0.065	0.97 \pm 0.027
C4	0.84 \pm 0.090	0.95 \pm 0.035
C5	0.88 \pm 0.084	0.90 \pm 0.079
C6	0.66 \pm 0.152 ^{a,b}	0.85 \pm 0.123
C7	0.70 \pm 0.062 ^{a,b}	0.94 \pm 0.065
C8	0.39 \pm 0.096 ^{a,b}	0.95 \pm 0.035
Sequim Bay	0.85 \pm 0.050 ^a	0.93 \pm 0.029
Bowman Bay	0.96 \pm 0.042	0.94 \pm 0.055
Fresh Sequim Bay ^c		0.93 \pm 0.029
Fresh Bowman Bay ^c		0.98 \pm 0.027

^a Significantly different from Bowman Bay; P=0.05.

^b Significantly different from Sequim Bay; P=0.05.

^c Fresh sediment bioassay controls.

Table 24. Toxicity of organic extracts of fresh and aged Duwamish Waterway and reference sediments determined by the bacterial bioluminescence assay. Results are expressed as estimates of the 15-min EC₅₀s and their 95% confidence intervals.

Sediment	Toxicity (15 min-EC ₅₀ and 95% C.I., uL/mL)	
	Fresh	Aged
C1	0.41(0.38 - 0.44)	0.53(0.51 - 0.55)
C2	0.43(0.39 - 0.47) 0.40(0.34 - 0.45)	0.61(0.53 - 0.69)
C3	0.06(0.05 - 0.06)	0.06(0.05 - 0.06)
C4	0.45(0.40 - 0.50) 0.42(0.37 - 0.48)	0.24(0.21 - 0.26)
C5	0.15(0.13 - 0.17)	0.07(0.07 - 0.08)
C6	0.18(0.17 - 0.20)	0.07(0.07 - 0.08)
C7	0.08(0.08 - 0.09)	0.08(0.08 - 0.09)
C8	0.06(0.04 - 0.07)	0.04(0.04 - 0.05)
Bowman Bay, West Beach	3.29(2.97 - 3.61)	7.85(6.92 - 8.77)

Table 25. Comparison of chemical data to Four Mile Rock criteria.

		column 4 of Four Mile Rock criteria	composite sample number 1-91								
			C 1 -a	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9
metals, ppm											
arsenic	17	8.7	12	17	14	18	17	20	34	22	
cadmium	0.75	0.13	0.15	0.45	0.26	0.42	0.35	0.39	3.1	0.64	
copper	100	15	16	32	22	32	32	35	120	35	
lead	140	8.6	8.9	20	14	17	17	24	160	12	
mercury	1.2	0.01	0.01	0.04	0.02	0.04	0.07	0.05	0.42	<.03	
zinc	400	57	57	91	71	84	79	89	270	93	
organics, ppb											
high molecular weight -b aromatic hydrocarbons	12,000	110	220	1,200	440	920	700	1,300	5,400	140	
low molecular weight -c aromatic hydrocarbons	750	47	140	180	92	150	120	260	3,500	43	
PCB's	670	23	38	31	13	76	43	120	3,900	2.7	
DDT -d	8	0.6	0.9	3.9	0.6	2.6	3.2	129	72	<0.5	

a These are the mean concentrations for metals for duplicate analysis.

b Summation of the concentrations of dibenzo[a,h]anthracene, benz[a]anthracene, benzo[a]pyrene, benzo[fluoranthene], chrysene, fluoranthene, indeno[1,2,3-cd]pyrene, pyrene, and benzo[ghi]perylene.

c Summation of the concentrations of acenaphthene, naphthalene, acenaphthylene, anthracene, phenanthrene, and fluorene.

d Summation of the concentrations of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT.

APPENDIX I

Chemical Tests on Sediment

NAF conducted physical and chemical tests on 9 sediment samples.

Detection Limits:

Pesticides:	1 ng/g (ppb) dry wt for individual compounds, 20 ppb for PCBs and 50 ppb for toxaphene
Heavy metals: As, Cd, Cu, Pb, Hg, Zn Hg	0.1 ug/g (ppm) dry wt 0.01 ug/g
Aromatic hydrocarbons:	20 ng/g (ppb) dry wt or lower
Blanks:	equivalent of ≤ 5 ng/g
Reference materials:	NAF Duwamish III sediment

Analytical Procedures:

Pesticides, Organics:	NOAA Tech Memo NMFS F/NWC-64, with only minor changes
Heavy metals:	Acid digestion and atomic absorption analysis

Quality Assurance

NAF analyzed 1 composite sediment sample in duplicate. The recovery of internal standards added to each sample at the beginning of the extraction procedure are reported. The following QA parameters and laboratory blanks with added standards shall be observed:

<u>Accuracy</u>	the recovery of standards added to lab blanks were recovered at $> +50\%$.
<u>Precision</u>	coefficients of variation generally were considerably $\leq + 25\%$.
<u>Reference Materials</u>	Duwamish III sediment for organics, NBS SRM or equivalent for metals (1 analysis for every set of 20 or fewer samples)
<u>Blanks</u>	2 samples

Sample with Added Standards
or Reference Material

1 reference sample was analyzed and standards were added to composited sediment C2 and percent recovery determined.

Replicates

C1 was analyzed in duplicate

Internal standards and blanks

results are included in tables

Instrument calibration and performance data

Tables I a-d in Appendix

Verification of reference materials,
standards, and solvents/reagents

solvents and reagents were tested prior to use to show that they were not contaminated. Standards and reference materials have been analyzed in replicate for verification.

Table Ia. Calibration standard comparison for gas chromatograph reproducibility.

^a

Sample #	47-225 - 47-232 SA2L2				47-225 - 47-232 SA1B				
	47-233	47-234 A	47-234 B	47-234 C	47-234	47-233 A	47-233 B	47-233 C	47-233 D
naphthalene	98	100	98	99	100	100	100	99	100
2-methylnaphthalene	98	100	100	100	102	104	100	100	100
1-methylnaphthalene	98	100	100	100	101	102	100	100	100
biphenyl	98	100	100	99	102	101	100	100	100
2,6-dimethylnaphthalene	98	100	100	100	101	100	100	100	100
acenaphthene	98	100	99	99	100	96	100	99	100
fluorene	100	100	100	100	102	100	100	101	101
phenanthrene	99	100	101	101	103	100	100	101	102
anthracene	99	100	101	100	103	100	100	101	102
1-methylphenanthrene	100	100	100	101	105	100	100	101	103
fluoranthene	100	100	101	101	105	100	100	100	104
pyrene	100	100	101	101	105	99	100	100	103
benz[a]anthracene	100	100	102	102	106	101	100	102	104
chrysene	101	100	102	102	105	100	100	101	104
benzo[e]pyrene	99	100	100	101	102	99	100	102	100
benzo[a]pyrene	100	100	101	101	103	98	100	101	101
perylene	105	100	99	99	98	96	100	100	101
dibenz[a,h]anthracene	83	100	102	104	123	95	100	105	104
naphthalene-d8	101	100	101	100	100	104	100	99	99
acenaphthene-d10	101	100	101	100	100	104	100	100	100
perylene-d12	102	100	100	101	103	100	100	102	102

^a Calibration standard comparisons are calculated by setting the results of one calibration = to 100% and calculating the other runs in terms of that one calibration.

Table 1b. Calibration standard comparison for gas chromatograph reproducibility.

Sample #	47-237 - 47-244 SA2-L2				47-237 - 47-244 SA1B			
	47-245 A	47-246 A2	47-246 B	47-246 C	47-245 D	47-245 A	47-245 B	47-245 F
naphthalene	109	91	100	100	101	99	100	100
2-methylnaphthalene	108	99	100	100	99	98	100	100
1-methylnaphthalene	107	93	100	100	99	98	100	100
biphenyl	107	99	100	99	99	99	100	100
2,6-dimethylnaphthalene	107	100	100	99	100	99	100	100
acenaphthene	108	101	100	99	101	100	100	98
fluorene	107	100	100	99	100	100	100	100
phenanthrene	105	101	100	99	99	102	100	99
anthracene	105	101	100	99	99	102	100	99
1-methylphenanthrene	104	102	100	93	99	103	100	99
fluoranthene	103	103	100	93	99	104	100	98
pyrene	103	103	100	93	99	104	100	99
benz[a]anthracene	104	107	100	99	99	104	100	97
chrysene	104	107	100	100	100	105	100	97
benzo[e]pyrene	105	110	100	101	101	106	100	96
benzo[a]pyrene	106	109	100	102	102	107	100	97
perylene	106	111	100	103	102	107	100	95
dibenz[a,h]anthracene	108	113	100	107	101	109	100	94
naphthalene-d8	107	87	100	99	96	96	100	100
acenaphthene-d10	108	100	100	100	99	98	100	101
perylene-d12	105	104	100	102	102	106	100	98

a Calibration standard comparisons are calculated by setting the results of one calibration = to 100% and calculating the other runs in terms of that one calibration.

Table 1C Calibration standard comparison for gas chromatograph reproducibility.^a

Sample #	47-225 - 47-232 SA2L2				47-225 - 47-232 SA1B			
	47-233 A	47-234 A	47-234 B	47-234 C	47-234	47-233 A	47-233 B	47-233 C
hexachlorobenzene	100	100	99	100	101	100	100	100
lindane (gamma-BHC)	99	100	101	101	99	100	104	103
heptachlor	100	100	104	105	98	100	103	103
aldrin	100	100	100	101	99	100	100	103
heptachlorepoxyde	99	100	100	100	99	100	100	102
alpha-chlordane	97	100	99	99	98	100	100	103
trans-nonachlor	97	100	98	99	105	100	118	109
dieldrin	97	100	99	99	98	100	100	103
mirex	128	100	125	126	99	100	99	100
o,p'-DDE	99	100	99	99	99	100	99	101
p,p'-DDE	97	100	97	98	93	100	99	102
o,p'-DDD	98	100	98	99	93	100	100	103
p,p'-DDD	97	100	98	99	96	100	102	104
o,p'-DDT	97	100	100	99	98	100	102	104
p,p'-DDT	98	100	99	98	96	100	103	106
dichlorobiphenyls	100	100	100	99	103	100	103	101
trichlorobiphenyls	100	100	100	99	101	100	100	100
tetrachlorobiphenyls	100	100	100	99	100	100	99	100
pentachlorobiphenyls	97	100	98	97	99	100	99	100
hexachlorobiphenyls	97	100	96	95	100	100	103	102
heptachlorobiphenyls	100	100	94	96	97	100	99	101
octachlorobiphenyls	98	100	94	96	95	100	95	99
nonachlorobiphenyls	97	100	99	97	96	100	95	98
1,2,3-trichlorobenzene	99	100	98	99	100	100	100	95

^a Calibration standard comparisons are calculated by setting the results of one calibration = to 100% and calculating the other runs in terms of that one calibration.

Table 1d Calibration standard comparison for gas chromatograph reproducibility.

Sample *	47-237 - 47-244 SA2L2			47-237 - 47-244 SA1B		
	47-245 A	47-246 A	47-246 B	47-245 B	47-245 C	47-245 D
hexachlorobenzene	107	100	100	100	99	73
lindane (gamma-BHC)	107	101	100	100	101	72
heptachlor	107	101	100	100	101	75
aldrin	107	100	100	100	100	75
heptachlorepoxyde	107	99	100	100	99	74
alpha-chlordane	107	99	100	100	101	76
trans-nonachlor	107	100	100	100	102	77
dieldrin	107	99	100	100	100	76
mirex	98	86	100	100	97	73
o,p'-DDE	107	99	100	100	97	73
p,p'-DDE	106	98	100	100	97	75
o,p'-DDD	106	99	100	100	100	76
p,p'-DDD	109	96	100	100	103	78
o,p'-DDT	102	102	100	100	101	75
p,p'-DDT	105	97	100	100	104	78
dichlorobiphenyls	106	100	100	100	98	73
trichlorobiphenyls	107	100	100	100	98	73
tetrachlorobiphenyls	107	100	100	100	97	73
pentachlorobiphenyls	106	99	100	100	98	73
hexachlorobiphenyls	105	97	100	100	98	75
heptachlorobiphenyls	106	98	100	100	99	75
octachlorobiphenyls	102	98	100	100	100	77
nonachlorobiphenyls	103	98	100	100	100	83
1,2,3-trichlorobenzene	110	100	100	100	93	72

a Calibration standard comparisons are calculated by setting the results of one calibration = to 100% and calculating the other runs in terms of that one calibration.

APPENDIX II

Quality assurance data showing that methods to be used are adequate for the analyses to be performed.

Tables 1 and 2 include the data for laboratory blanks (LB) and LB with added standards (LBAS) for the chemicals routinely analyzed by NAF.

Table 3 shows the concentrations of aromatic hydrocarbons in our Duwamish III reference sediment for triplicate analyses by three chemists in our lab.

Table 4 is the same as Table 3 with 3 data points omitted, one for naphthalene and two for anthracene.

Table 5 shows the concentrations of PCBs and pesticides in our Duwamish III reference sediment.

Appendix II -

Table 1.

Concentrations of aromatic hydrocarbons in blank samples and % recoveries of spiked blanks.

		blanks			sp. blanks		
		chem. 1	chem. 2	chem. 3	chem. 1	chem. 2	chem. 3
		50-404	50-413	50-424	50-403	50-414	50-423
naphthalene	<	10	<	7.8	<	7.5	100%
2-methyl naphthalene	<	11	<	8.2	<	7.8	100%
1-methyl naphthalene	<	11	<	8.0	<	7.6	100%
biphenyl	<	8.1	<	7.8	<	7.5	100%
2,6-dimethyl naphthalene	<	7.9	<	7.6	<	7.4	100%
acenaphthene	<	8.4	<	8.1	<	7.8	100%
fluorene	<	7.4	<	7.1	<	6.8	100%
phenanthrene	<	6.7	<	6.3	<	6.0	100%
anthracene	<	6.5	<	6.1	<	5.8	100%
1-methyl phenanthrene	<	6.2	<	5.8	<	5.5	100%
fluoranthene	<	6.1	<	5.7	<	5.4	100%
pyrene	<	6.0	<	5.6	<	5.3	100%
benz[a]anthracene	<	6.0	<	5.5	<	5.6	100%
chrysene	<	6.5	<	6.0	<	6.1	100%
benzo[e]pyrene	<	6.3	<	5.9	<	5.8	100%
benzo[a]pyrene	<	6.5	<	6.1	<	5.9	100%
perylene	<	6.5	<	7.0	<	5.9	100%
dibenz[a,h]anthracene	<	6.4	<	6.8	<	6.1	100%
recovery of naphthalene-d8		63%	91%	92%	90%	72%	99%
recovery of acenaphthene-d10		80%	92%	90%	91%	75%	100%
recovery of perylene-d12		79%	92%	85%	90%	77%	96%

Concentrations of chlorinated hydrocarbons in blank samples and % recoveries of spiked blanks.

a

	blanks			sp. blanks		
	chem. 1	chem. 2	chem. 3	chem. 1	chem. 2	chem. 3
	50-404	50-413	50-424	50-403	50-414	50-423
hexachlorobenzene	< .62	< .45	< .47	54%	140%	59%
lindane (gamma-BHC)	< .95	< .67	< .69	110%	130%	100%
heptachlor	< 1.7	< 1.4	< 1.4	84%	96%	77%
aldrin	< .90	< .63	< .66	100%	140%	100%
heptachlorepoxyde	< 1.4	< 1.0	< 1.0	100%	160%	98%
alpha-chlordane	< .85	< .62	< .63	110%	140%	110%
trans-nonachlor	< .90	< .64	< .67	100%	140%	100%
dieldrin	< 1.8	< 1.3	< 1.4	100%	120%	93%
nirex	< 1.3	< .92	< .95	100%	150%	100%
o,p'-DDE	< 1.3	< .95	< .94	110%	140%	100%
p,p'-DDE	< .76	< .52	< .56	100%	140%	100%
o,p'-DDD	< 2.4	< 1.8	< 1.9	98%	140%	97%
p,p'-DDD	< 2.2	< 1.8	< 1.8	96%	140%	93%
o,p'-DDT	< 2.4	< 1.7	< 1.7	110%	150%	100%
p,p'-DDT	< 1.7	< 1.3	< 1.3	110%	150%	110%
dichlorobiphenyls	< 2.9	< 2.1	< 2.2	100%	140%	100%
trichlorobiphenyls	< 1.4	< 1.1	< 1.1	110%	150%	100%
tetrachlorobiphenyls	< 1.4	< 1.0	< 1.1	110%	170%	99%
pentachlorobiphenyls	< 1.3	< 1.0	< 1.0	110%	150%	100%
hexachlorobiphenyls	< 1.2	< .86	< .90	110%	150%	100%
heptachlorobiphenyls	< .86	< .62	< .62	100%	150%	100%
octachlorobiphenyls	< .80	< .57	< .60	92%	160%	95%
nonachlorobiphenyls	< 1.2	< .87	< .83	76%	150%	79%
2,3,6 trichlorotoluene	14	20	9.1	71%	140%	94%
recovery of acenaphthene-d10	80%	92%	90%	91%	75%	100%

a The concentrations and recoveries of compounds are calculated using % recovery of acenaphthene-d10.

Appendix II -

Table 3.

Concentrations of aromatic hydrocarbons in Duwamish III sediment samples, ng/g dry weight.

	chemist 1			chemist 2			chemist 3			\bar{x}	s	CV
	50-399	50-400	50-401	50-409	50-410	50-411	50-419	50-420	50-421			
naphthalene	230	330	880	310	310	300	280	320	320	350	200	56
2-methyl naphthalene	150	140	230	160	190	150	130	150	150	170	30	18
1-methyl naphthalene	120	100	210	100	100	110	96	99	110	120	40	33
biphenyl	34	35	59	40	46	38	33	39	41	41	8	19
2,6-dimethyl naphthalene	69	61	50	76	85	74	64	71	89	75	11	14
acenaphthene	320	330	470	360	350	330	360	320	330	350	50	14
fluorene	310	310	460	350	590	320	310	320	380	370	90	24
phenanthrene	2400	2300	2600	2500	3000	2300	2200	2100	2200	2400	300	12
anthracene	520	510	580	620	2200	540	460	530	1300	810	580	72
1-methyl phenanthrene	240	220	240	220	270	220	190	190	200	220	30	14
fluoranthene	3800	3600	3900	3700	4000	3600	3200	3100	3100	3600	300	8
pyrene	4200	3900	4100	4000	4500	3700	3500	3300	3500	3900	400	10
benz[a]anthracene	1600	1600	1800	2000	2400	2000	1700	1700	1500	1800	300	17
chrysene	2500	2600	3000	3200	4200	3100	2800	2800	2500	3000	500	17
benzo[e]pyrene	1700	1800	1800	2000	2500	1900	1800	1500	1600	1900	300	16
benzo[a]pyrene	1900	1900	2000	2100	2600	2000	2000	1700	1800	2000	300	15
perylene	500	550	610	700	900	740	570	550	550	640	120	19
dibenz[a,h]anthracene	340	300	330	340	510	330	310	280	290	340	70	21
recovery of naphthalene-d8	70%	71%	70%	81%	78%	78%	90%	83%	83%	80	7	9
recovery of acenaphthene-d10	95%	84%	94%	93%	90%	90%	100%	91%	100%	93	5	5
recovery of perylene-d12	87%	68%	71%	64%	62%	62%	74%	69%	65%	71	9	13
sample weight, g	10.15	10.13	10.17	10.16	10.28	10.26	10.38	10.27	10.18			
% dry weight	53.41	53.87	53.29	52.49	52.48	52.32	54.43	63.26	56.47			

Appendix II -

Table 4.

Concentrations of aromatic hydrocarbons in Duwamish III sediment samples, ng/g dry weight.

	chemist 1			chemist 2			chemist 3			\bar{x}	s	CV
	50-399	50-400	50-401	50-409	50-410	50-411	50-419	50-420	50-421			
naphthalene	230	330	-	310	310	300	280	320	320	300	30	10
2-methyl naphthalene	150	140	230	160	190	150	130	150	190	170	30	18
1-methyl naphthalene	120	100	210	100	100	110	95	99	110	120	40	33
biphenyl	34	36	59	40	45	38	33	39	41	41	8	20
2,6-dimethyl naphthalene	69	61	90	76	85	74	64	71	69	75	11	15
acenaphthene	320	330	470	360	350	330	360	320	320	350	50	14
fluorene	310	310	400	350	590	320	310	320	360	370	90	24
phenanthrene	2400	2300	2600	2500	3000	2300	2200	2100	2200	2400	300	12
anthracene	520	510	580	620	-	540	460	530	-	540	50	9
1-methyl phenanthrene	240	220	240	220	270	220	190	190	200	220	30	14
fluoranthene	3800	3600	3900	3700	4000	3600	3200	3100	3100	3600	300	8
pyrene	4200	3900	4100	4000	4500	3700	3500	3300	3500	3300	400	10
benz[a]anthracene	1600	1600	1800	2000	2400	2000	1700	1700	1500	1800	300	17
chrysene	2600	2600	3000	3200	4200	3100	2800	2800	2500	3000	500	17
benzo[e]pyrene	1700	1800	1800	2000	2500	1900	1800	1600	1600	1900	300	16
benzo[a]pyrene	1900	1900	2000	2100	2600	2000	2000	1700	1800	2000	300	15
perylene	560	550	610	700	900	740	570	550	550	640	120	19
dibenz[a, h]anthracene	340	300	330	340	510	330	310	280	290	340	70	21
recovery of naphthalene-d8	70%	71%	78%	81%	78%	76%	90%	83%	89%	80	7	9
recovery of acenaphthene-d10	55%	84%	94%	93%	90%	90%	100%	91%	100%	93	5	5
recovery of perylene-d12	87%	68%	71%	64%	62%	62%	74%	63%	65%	71	9	13
sample weight, g	10.15	10.13	10.17	10.16	10.28	10.26	10.38	10.27	10.18			
% dry weight	53.41	53.87	53.29	52.49	52.49	52.32	54.43	63.26	56.47			

Appendix II -
Table 5.

Concentrations of chlorinated hydrocarbons in Dumanish III sediment samples, ng/g dry weight. ^a

	chemist 1			chemist 2			chemist 3			\bar{x}	s	CV				
	50-399	50-400	50-401	50-409	50-410	50-411	50-419	50-420	50-421							
hexachlorobenzene	.63	<	.51	.56	.67	.65	.60	<	.39	<	.35	<	.45	.62	.04	6
lindane (gamma-BHC)	<	.91	<	.90	<	.75	<	.83	<	.84	<	.72	<	.64	<	.82
heptachlor	<	1.7	<	1.7	<	1.6	<	1.8	<	1.8	<	1.5	<	1.3	<	1.6
aldrin	<	.81	<	.80	<	.71	<	.79	<	.80	<	.64	<	.56	<	.72
heptachlorepoxyde	<	1.3	<	1.3	<	1.1	<	1.3	<	1.3	<	1.0	<	.89	<	1.1
alpha-chlordane		1.9		1.6		1.6		2.9		1.6		1.5		1.3		1.4
trans-nonachlor		1.0		1.2		1.3		1.0		1.2		1.2		.85		1.1
dieldrin	<	1.6	<	1.6	<	1.5	<	1.6	<	1.6	<	1.4	<	1.2	<	1.6
mirex	<	1.1	<	1.1	<	.86	<	1.0	<	1.1	<	.85	<	.75	<	.96
o,p'-DDE																
p,p'-DDE																
o,p'-DDD																
p,p'-DDD																
o,p'-DDT																
p,p'-DDT																
dichlorobiphenyls	4.8		4.8	4.0	5.3	6.7	4.5		4.5		3.0		5.6	4.8	1.0	21
trichlorobiphenyls	53		55	52	55	47	58		49		37		49	51	6	12
tetrachlorobiphenyls	200		190	180	190	230	200		190		170		170	190	20	11
pentachlorobiphenyls	550		490	440	490	670	520		500		430		430	500	80	16
hexachlorobiphenyls	460		410	350	400	580	420		430		370		360	420	70	17
heptachlorobiphenyls	130		120	110	120	300	130		130		120		130	140	60	43
octachlorobiphenyls	20		32	30	29	84	27		28		31		24	34	19	56
nonachlorobiphenyls	10		6.3	14	5.3	40	7.4		6.0		14		6.6	12	11	92
recovery of acenaphthene-d10	95%		84%	94%	93%	90%	90%		100%		91%		100%	93	5	5
sample weight, g	10.15		10.13	10.17	10.16	10.28	10.26		10.38		10.27		10.18			
% dry weight	53.41		53.87	53.29	52.49	52.48	52.32		54.43		63.26		56.47			

a. The concentrations of

^a The concentrations of compounds were calculated using % recovery of acenaphthene-d10.

Appendix IV. Selected physical properties of aged test sediments and their interstitial water measured at the start and completion of 10-day amphipod bioassays.

Sediment	<u>pH</u>		<u>Salinity</u>		<u>Mean Eh (mv)</u>	
	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10
C1	6.7	6.6	28.5	28.5	+133	+151
C2	6.7	6.6	28.5	29.7	+ 69	+172
C3	7.5	6.4	28.5	29.5	+ 62	+ 87
C4	7.0	6.5	28.5	29.7	+142	+117
C5	6.8	6.5	29.0	29.5	+ 54	+ 78
C6	7.2	6.5	28.5	29.5	- 16	+ 60
C7	6.5	6.1	28.5	28.5	+ 15	+ 74
C8	7.2	7.0	29.0	29.5	+ 5	+ 58
Aged Sequim Bay	7.2	7.1	29.0	29.5	+125	+ 36
Aged Bowman Bay	7.2	6.3	29.0	28.5	+170	+127
Fresh Sequim Bay	7.4	7.1	31.0	28.5	+ 87	+112
Fresh Bowman Bay	7.6	7.3	30.5	29.7	+ 69	+ 44

Appendix III. Selected physical properties of fresh test sediments and their interstitial water measured at the start and completion of 10-day amphipod bioassays.

Sediment	<u>pH</u>		<u>Salinity</u>		<u>Mean Eh (mv)</u>	
	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10
C1	7.4	7.9	26.9	28.0	+105	+128
C2	7.2	7.4	26.4	27.0	+ 76	+150
C3	7.0	7.3	26.5	27.0	+ 47	+ 30
C4	6.9	7.6	26.3	27.0	+ 41	+ 32
C5	7.0	7.4	26.1	27.0	+ 51	- 15
C6	6.9	7.1	27.8	27.0	+ 48	+ 25
C7	7.1	7.3	28.0	27.0	+ 51	- 23
C8	7.4	7.8	30.2	27.5	+ 19	- 9
Sequim Bay	7.6	7.7	31.0	28.0	+126	- 39
Bowman Bay	7.0	7.3	28.7	27.0	+360	+ 79

PORT OF SEATTLE

P.O. BOX 1209

SEATTLE, WASHINGTON 98111

TERMINAL 30 EXPANSION

SEDIMENT CHEMISTRY ANALYSIS

*This T-30 material constitutes
the greatest portion of contaminated
fill in the T-91 short fill*

MEMORANDUM

DATE December 19, 1984

TO John Dohrmann, Senior Environmental Planner

FROM Doug Hotchkiss, Consultant

SUBJECT Arithmetic Mean Values of T-32 Sediment Compared to 4-Mile Rock, Deep Central Basin and Pre-1900 Values

Contaminant		T-32 Sediments			4-Mile Rock Criteria (125%)	T-32 Sediments			METRO TPPS Study	
		Failing 4-Mile Rock Criteria				Passing 4-Mile Rock Criteria			Deep Central Basin	Pre 1900
As	ppm	17.4	+	3.3	19	3.7	+	1.1	10	6
Cd	ppm	5.0	+	2.9	0.9	0.68	+	.25	.32	.39
Cu	ppm	119.0	+	48.7	115.	17.6	+	7.2	36	25
Pb	ppm	188.1	+	95.5	158.	11.3	+	15.5	38	6
Hg	ppm	1.0	+	0.44	1.4	0.05	+	0.06	0.14	0.05
Zn	ppm	435.9	+	244	450.	39.1	+	11.3	99	80
PcB's	ppb	2763	+	2498	760	5.9	+	24	125	13
DDT's	ppb	72	+	74	9		N.D.		1.5	.24
High										
PAH's	ppb	8485	+	7206	14,000	292	+	547	2,200	340
Low										
PAH's	ppb	3778	+	3620	855	236	+	202	-160	170

5166p



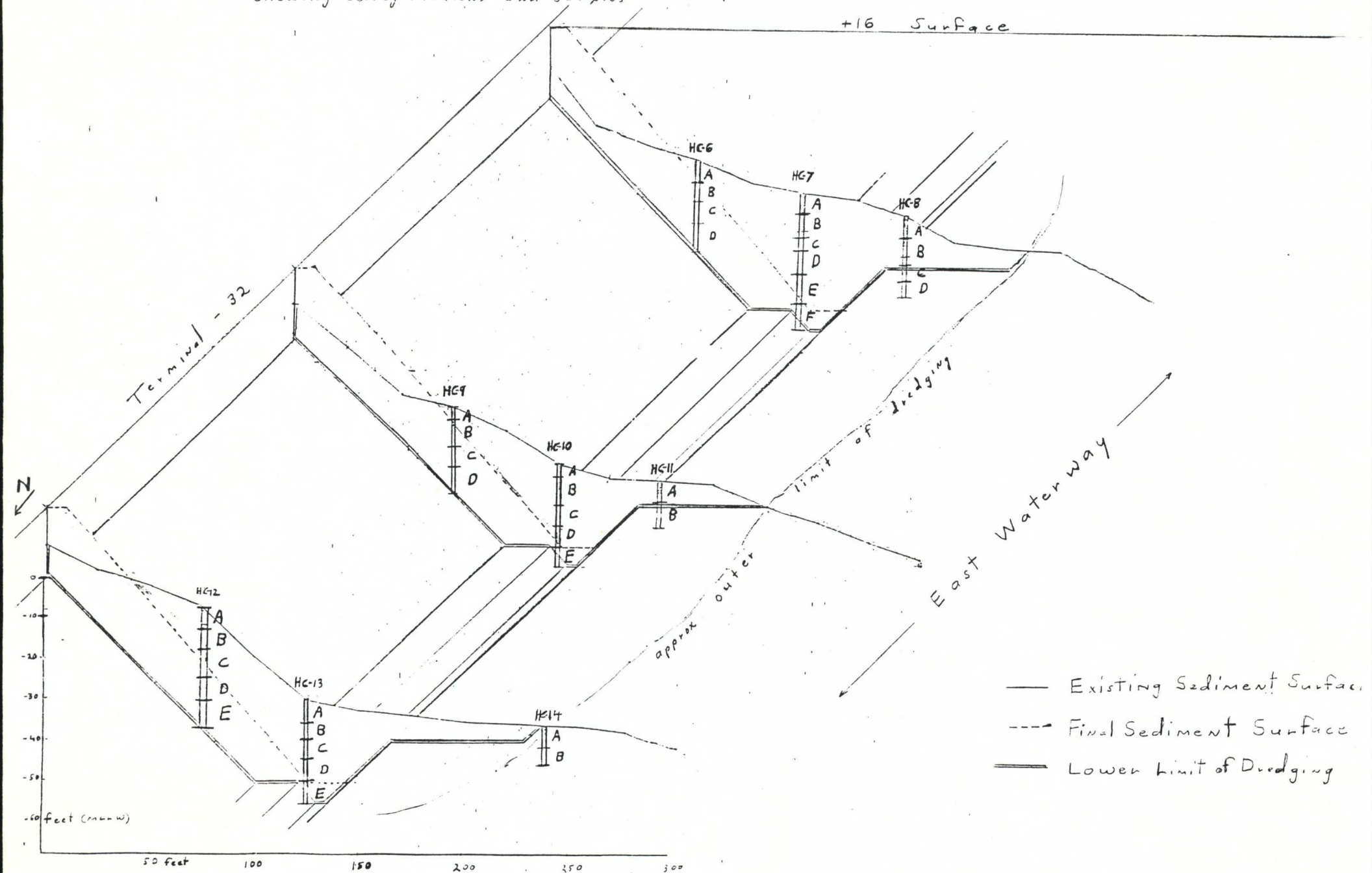
Terminal 32
Projection of Cross Sections
showing boring stations and samples

S ↗

Pier 28 ↗

+16 Surface

Terminal - 32



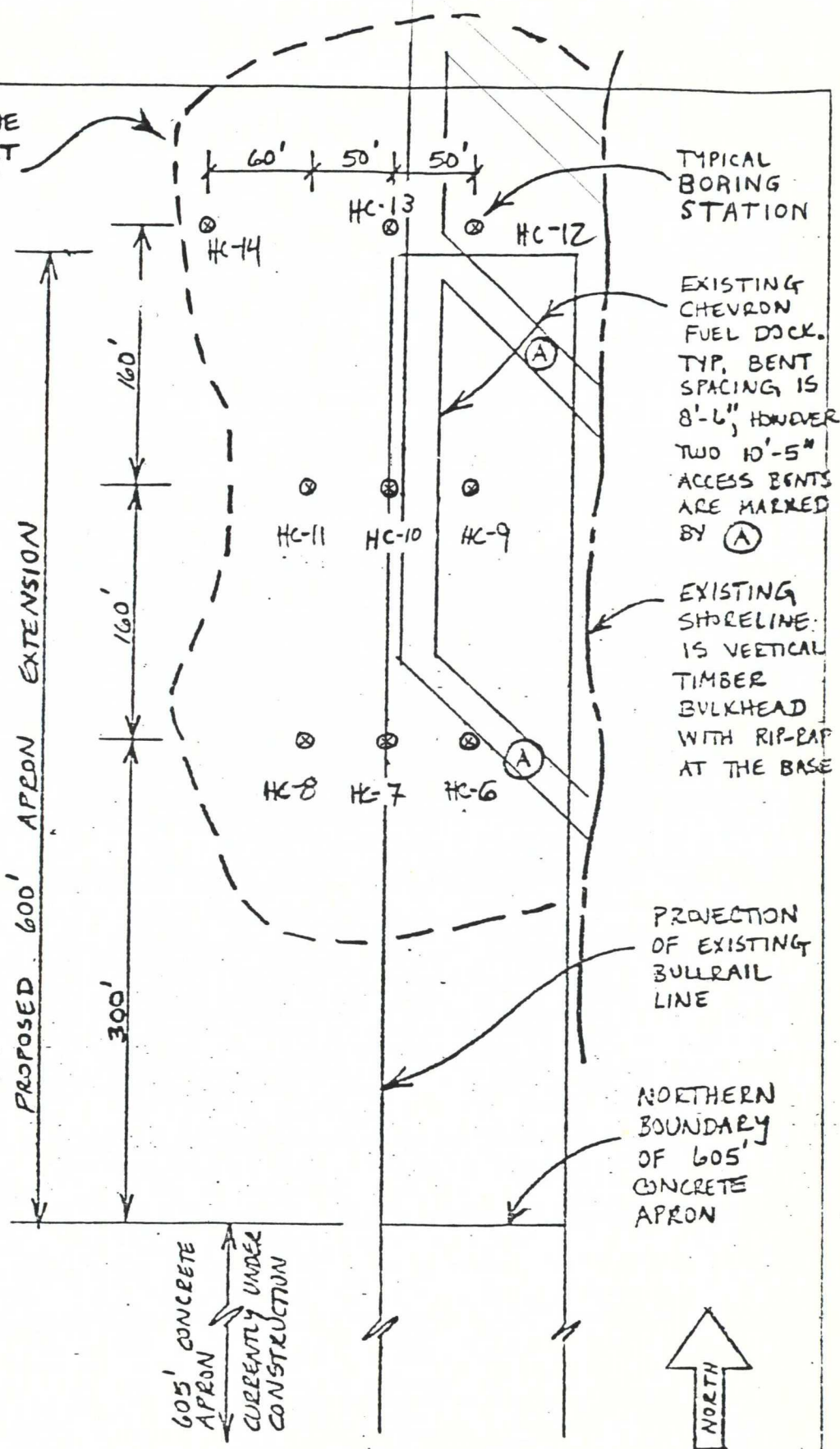
- Existing Sediment Surface
- - - Final Sediment Surface
- == Lower limit of Dredging

PRELIMINARY OUTLINE
OF DREDGING IMPACT
FOR PROPOSED 600'
APRON EXTENSION.

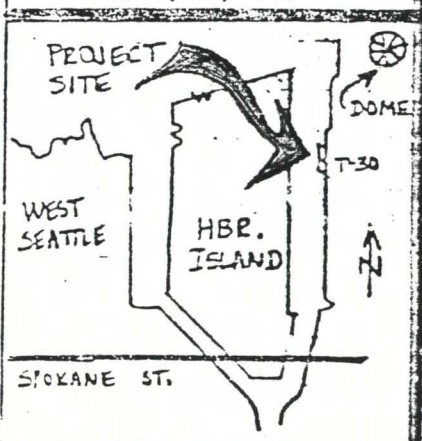
Boring Stations

HC-6 thru HC-14

T-32



VICINITY MAP



PORT OF SEATTLE COMMISSION

PROJECT T-30 NORTHWARD EXTENSION

TITLE SEDIMENT SAMPLING FOR CONTAMINANTS

DRAWN BY DS DATE 5/15/84 APPROVED _____

DESIGN NO.
D 3226

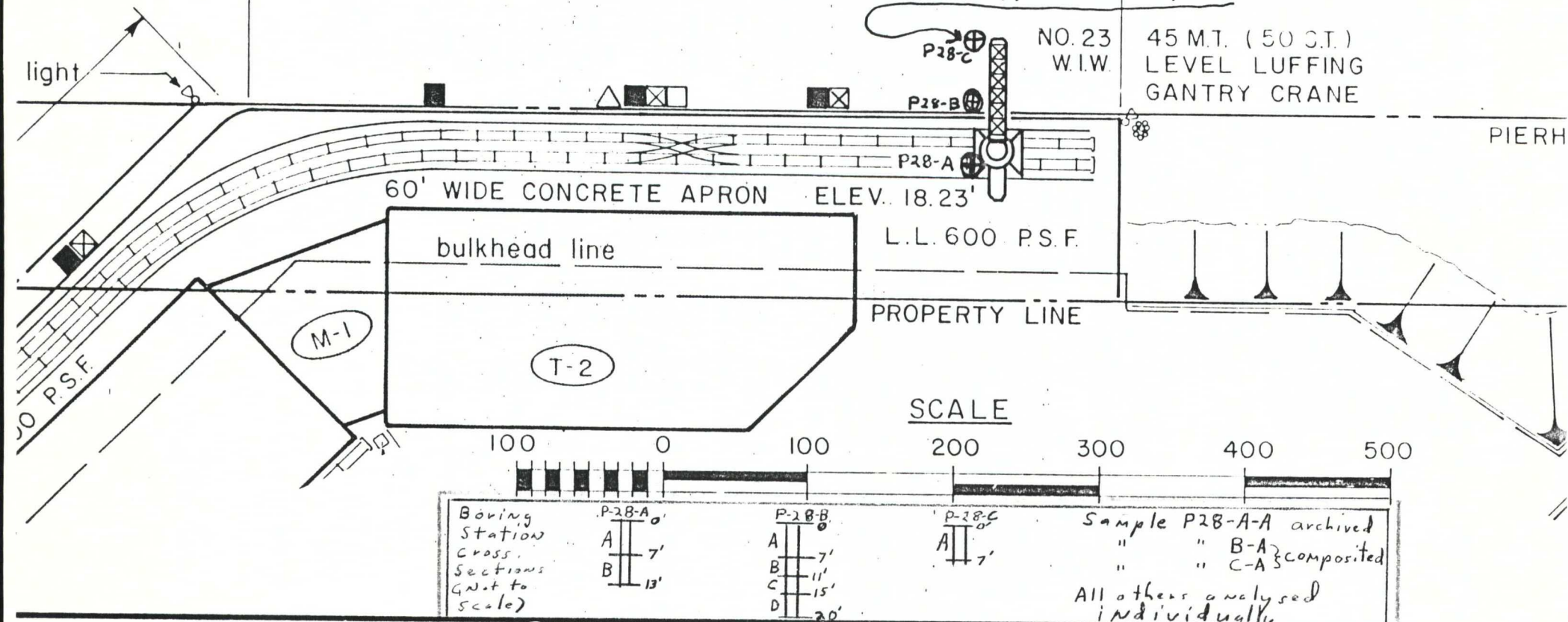
DRAWING NO.
C 086

EAST WATERWAY

BERTH NO. 2 600'

CONTROLLING DEPTH ELEV. -40' (MLLW = 0')

TYPICAL BORING STATION



PORT OF SEATTLE

MARINE FACILITIES

TERMINAL 30

Pier 28 Sediment Boring Stations

ADDRESS: 2431 EAST MARINAL WAY SOUTH 00174

WORK ORDER NO.

CONSULTANT'S NO.

PORT OF SEATTLE

ME 10

JECT ENGR

SCALE:

NOTED

IGNER

JOHN L. FOX

DATE:

MARCH 18, 1983

WN BY

JOHN L. FOX

CHECKED BY:

ROVED BY

Walter D. Pitch

T-30 EXPANSION

BORING	SAMPLE	DEPTH RANGE(ft)	LAB #	AMPHIPOD BIOASSAY # SURVIVE P/F /std dev	HEAVY METALS P/F (# F)	PCBs P/F (ppb)	DDTs P/F (ppb)	LOW PAHs P/F (ppb)	HIGH PAHs P/F (ppb)	OTHER DATA (O&G-oil & grease)
HC-6	A	1-4	S-1	F 8.6/2.9	F (6)	F (6610)	F (170)	P (nd)	P (nd)	O&G 1.8% Abnorm Oyster 48.9%
(cutoff)	B	4-10	S-2/3	F 12.2/2.9	F (1)	F (2810)	F (95)	F (3800)	P (nd)	O&G 1.0% Abnorm Oyster 31.0%
	C	11.5-16.5	J	P 17.4/1.5	P	P (nd)	P (nd)	P (315)	P (203)	O&G 0.04%
	D	16.5-22	K	P 17.6/1.5	P	P (nd)	P (nd)	P (243)	P (254)	O&G 0.03%
HC-7	A	0-4.5	S-1	F 3.4/1.5	F (6)	F (2500)	F (81)	F (3230)	F (28800)	O&G 1.8% Abnorm Oyster 72.0%
	B	4.5-8.5	S-2	F 0.2/0.4	F (6)	P (140)	P (nd)	F (2060)	P (11030)	O&G 2.0% Abnorm Oyster 60.0%
	B'	8-11	S-3	F 0/ 0						NO CHEM SAMPLED Abnorm Oyster 62.5%
	C	11-14	S-3/4	F 12.8/3.0	F (4)	P (150)	P (nd)	F (3630)	F (17160)	O&G 0.98%
(cutoff)	D	16-20	L							ARCHIVE
	E	21-27	M	P 18.0/1.2	P	P (nd)	P (nd)	P (586)	P (27)	O&G 0.05%
	F	28-33	N	P 17.0/2.0	F (1)	P (nd)	P (nd)	P (214)	P (67)	O&G 0.01%
HC-8	A	0-3.5	S-1	F 8.6/1.2	F (1)	F (1200)	P (nd)	F (6380)	P (10570)	O&G 0.47% Abnorm Oyster 53.7%
	B	4.5-6.5	S-2	F 7.6/2.5	F (4)	F (3740)	F (80)	P (nd)	P (nd)	O&G 0.90% Abnorm Oyster 27.6%
(cutoff)	B'	8.5-12.5	S-3	F 13.2/3.0						NO CHEM TEST Abnorm Oyster 19.2%
	C	12.5-14.5	S-4							ARCHIVE
	D	16-19	S-4/5	P 18.4/1.5						
HC-9	A	0-3	S-1/2	F 13.4/2.2	F (3)	P (420)	F (47)	F (1900)	P (6090)	O&G 0.67% Abnorm Oyster 22.9%
(cutoff)	B	3-8	S-2/3/4	P 17.8/1.0	P	P (nd)	P (nd)	P (440)	P (1670)	O&G 0.25% Abnorm Oyster 18.4%
	C	10-15	O	P 15.4/3.2	P	P (nd)	P (nd)	P (359)	P (85)	O&G 0.09%
	D	15-20	P	P 16.0/1.9	P	P (nd)	P (nd)	P (nd)	P (57)	O&G 0.05%
HC-10	A	0-3.5	S-1	F 10.6/1.7	CHEM	COMPOSITED SEE	HC-9-A			Abnorm Oyster 19.3%
	B	3.5-7.5	S-2	F 9.6/1.7	F (1)	F (3100)	F (105)	F (6350)	P (9200)	O&G 0.5% Abnorm Oyster 22.0%
(cutoff)	B'	8.5-11	S-3	P 17.6/1.8	P	F (1000)	P (nd)	P (440)	P (nd)	O&G 0.17% Abnorm Oyster 26.4%
	C	13.5-16	S-4	P 16.4/3.4	P	P (nd)	P (nd)	P (nd)	P (nd)	O&G 0.02%
	D	16.5-20.5	F	P 14.0/2.2	F (1)	P (nd)	P (nd)	P (nd)	P (205)	O&G 0.01%

	E	20.5-25	G	COMPOSITED SEE					HC-10-D				
HC-11	A	0-3	S-1	F	10.4/3.4	CHEM	COMPOSITED SEE					HC-9-A	
	B	5-12	S-2/3	F	12.0/4.3								Abnorm Oyster 41.6% NO CHEM TEST
HC-12 (cutoff)	A	0-3.5	S-1	F	11.2/3.0	F (6)	F (5200)	F (160)	F (9900)	F (15100)	O&G 1.1%		
	B	5.5-9	S-2	P	18.2/0.4	P	P (100)	P (nd)	P (nd)	P (nd)	O&G (nd)	Abnorm Oyster 42.9%	
	C		S	P	18.0/2.9	P	P (nd)	P (nd)	P (nd)	P (nd)	O&G 0.11%	Abnorm Oyster 23.6%	
	D		T										
	E		U	F	13.0/2.9	P	P (nd)	P (nd)	P (205)	P (nd)	O&G (nd)		
HC-13	A	0-6.5	S-1/2	F	10.4/4.0	F (1)	P (140)	P (4)	F (2080)	P (10620)	O&G 0.58		
	B	6.5-9	S-2/3	P	17.8/1.3	F(3)	P (120)	P(nd)	F(2680)	F (20250)	O&G 0.88%	Abnorm Oyster 39.6%	
(cutoff)	C	10.5-15	S-1/2/4	P	16.8/2.6	P	P (nd)	P (nd)	P (350)	P (1780)	O&G 0.07%	Abnorm Oyster 37.3%	
	D	16-20	H	P	17.6/1.7	P	P (nd)	P (nd)	P (598)	P (232)	O&G 0.29%	Abnorm Oyster 13.4%	
	E	21.5-25	I	P	16.8/1.6	P	P (nd)	P (nd)	P (401)	P (87)	O&G 0.08%		
HC-14	A	0-4.5	S-1/2	F	12.4/2.9	CHEM	COMPOSITED SEE					HC-13-A	Abnorm Oyster 25.5%
	B	5-9	S-3/4	F	5.4/4.3	F (1)	P (200)	F (20)	P (nd)	P (3670)	O&G 0.21%	Abnorm Oyster 25.0%	

PIER 28													
28-A	V	0-7										ARCHIVE	
	W	7-12		F	14.6/0.9	P	P (nd)	P (nd)	P (232)	P (1158)	O&G 0.05%		
28-B	A	0-6		F	2.4/1.1	F (1)	P (128)	F (70)	F (5760)	P (4120)	O&G 3.5%		
	B	6-10		F	12.4/3.4	P	P (nd)	P (nd)	P (110)	P (nd)	O&G 0.03%		
	C	10-15		F	13.0/4.1	P	P (nd)	P (nd)	P (nd)	P (nd)	O&G (nd)		
	D	15-20		F	12.0/1.6	P	P (nd)	P (nd)	P (nd)	P (205)	O&G (nd)		
28-C	D	0-6		COMPOSITED SEE 28-B-A									

SEDIMENT ANALYSIS T-30 EXPANSION
RAW DATA REPORT CONTENTS AND SUMMARY

I. Laucks First Series Data Only

(Station) Boring	(Depth) Sample	Lab Data Identification	Lab Number	4-Mile Criteria	Disposal Required
12	A	7	7	Fail	Contained
6	A	15	15	"	"
6	B	16	16	"	"
8	A	22	22	"	"
8	B	23	23	"	"
10	B	28	28	"	"
10	B	29	29	"	"
12	B	36	36	Pass	Open
14	B	42	42	Fail	Contained

II. Laucks Second Series Data Only

Boring	Sample	Identification	Number	Criteria	Disposal
13	C	A	37 & 38	Pass	Open
13	B	B	11 & 12	Fail	Contained
10	C	C	30	Pass	Open
9	B	5	33 & 34	Pass	Open
7	B	8	19	Fail	Contained
7	C	9	20	Fail	Contained

III. AMTest Data (QA/QC Included)

Boring	Sample	Identification	Number	Criteria	Disposal
*B & C	A	A & D	81286	Fail	Contained
* B	B	B	" 87	"	"
* B	C	C	" 88	"	"
* B	D	E	" 89	"	"
10	D & E	F & G	" 90	Pass	Open
13	D	H	" 91	"	"
13	E	I	" 92	"	"
6	C	J	" 93	"	"
6	D	K	" 94	"	"
7	E	M	" 95	"	"
7	E	M	" 96	"	"
7	F	N	" 97	"	"
9	C	O	" 98	"	"
9	D	P	" 99	"	"
12	C	S	81300	"	"
12	D & E	T & U	" 01	"	"
* A	B	W	" 02	Fail	Contained

IV. Laucks First Series QA/QC

V. Laucks Second Series QA/QC

I. FIRST SERIES DATA ONLY

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CLIENT Port of Seattle
P.O. Box 1209
Seattle, WA 98111
ATTN: Doug Hotchkiss

LABORATORY NO. 85194

DATE Aug. 6, 1984

REPORT ON SOIL

SAMPLE IDENTIFICATION

Samples were submitted and assigned sequential sample numbers. At your request, only the samples identified below were analyzed:

Boring Sample										Criteria	Disposal Method	
TESTS PERFORMED AND RESULTS:												
	12	A	7	J-1404	HCE-12	S-1	0-3.6'	0-3'	(2)	6-27	Fail	Contained
	6	A	15	J-1404	HCE-6	S-1	1.1-4.1'	1.1-4.1'	(2)	6-20	"	"
	6	B	16	J-1404	HCE-6	S-2	7.3-10.3'	4.1-7.1'	(2)	6-20	"	"
	8	A	22	J-1404	HCE-8	S-1	0-3.4'	0-3'		6-22	"	"
	8	B	23	J-1404	HCE-8	S-2	4.5-6.5'	4.7-6.7'		6-22	"	"
	10	B	28	J-1404	HCE-10	S-2	3.5-7.5'	4.5-7.5'		6-22	"	"
	10	B	29	J-1404	HCE-10	S-3	8.5-10.5'	8.7-10.7'		6-22	"	"
	12	B	36	J-1404	HCE-12	S-2	5.5-9.0'	5.5-9.0'		6-27	Pass	Open
	14	B	42	J-1404	HCE-14	S-4	6.8-8.8			6-27	Fail	Contained

Samples were passed through a No. 10 sieve prior to analysis. Only material passing the sieve was analyzed. Percentages retained were as follow:

	12-A	6-A	6-B	8-A	8-B
	<u>7</u>	<u>15</u>	<u>16</u>	<u>22</u>	<u>23</u>
% retained	6	3	6	L/2	6
Major description	wood	wood	wood	—	shells
Minor description	shells, rocks	shells, rocks	shells, rocks, foil	—	—
	10-B	10-B	12-B	14-B	
	<u>28</u>	<u>29</u>	<u>36</u>	<u>42</u>	
% retained	6	L/2	L/2	L/2	
Major description	shells	—	—	—	
Minor description	wood	—	—	—	



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Routine analyses were then performed on the samples, with results as follow:

	<u>% , as received basis</u>				
	<u>12-A</u> <u>7</u>	<u>6-A</u> <u>15</u>	<u>6-B</u> <u>16</u>	<u>8-A</u> <u>22</u>	<u>8-B</u> <u>23</u>
Total Solids	52.0	45.5	54.8	52.9	50.0

	<u>10-B</u> <u>28</u>	<u>10-B'</u> <u>29</u>	<u>12-B</u> <u>36</u>	<u>14-B</u> <u>42</u>
Total Solids	52.8	75.2	74.9	68.2

	<u>% , dry basis</u>				
	<u>7</u>	<u>15</u>	<u>16</u>	<u>22</u>	<u>23</u>
Total Organic Carbon	3.3	5.2	3.4	2.2	3.0
Total Volatile Solids	9.2	11.4	7.2	6.7	9.1
Oil & Grease	1.1	1.8	1.0	0.47	0.90
Sulfide as S	.030	.046	.076	.063	.043
Sand	22.7	7.6	42.8	28.8	16.9
Silt	55.3	65.0	42.1	52.8	55.6
Clay	22.0	27.4	15.1	18.4	27.5

	<u>28</u>	<u>29</u>	<u>36</u>	<u>42</u>
Total Organic Carbon	2.5	0.9	0.1	2.0
Total Volatile Solids	6.9	3.3	1.2	6.2
Oil & Grease	0.50	0.17	L/0.01	0.21
Sulfide as S	.007	.003	.004	.005
Sand	22.6	81.6	88.4	51.0
Silt	53.6	13.5	9.8	36.9
Clay	23.8	4.9	1.8	12.1



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Samples were then analyzed for Halogenated Hydrocarbons in accordance with Washington State Department of Ecology WAC 173-303 with results as follow:

	<u>12-A</u> <u>7</u>	<u>6-A</u> <u>15</u>	<u>6-B</u> <u>16</u>	<u>8-A</u> <u>22</u>	<u>8-B</u> <u>23</u>
Halogenated Hydrocarbons* parts per million (mg/kg), as received basis	L/15.	L/15.	L/15.	L/15.	L/15.
	<u>10-B</u> <u>28</u>	<u>10-B'</u> <u>29</u>	<u>12-B</u> <u>36</u>	<u>14-B</u> <u>42</u>	<u>MCL</u>
Halogenated Hydrocarbons* parts per million (mg/kg), as received basis	L/15.	L/15.	L/15.	L/15.	*

* reported as the sum of the halogens bromide, chloride, fluoride and iodide.
A result of less than 100 parts per million is classified as undesignated waste.

Samples were analyzed in accordance with 40 CFR, Part 261.24 for EP Toxicity, with results as shown below:

	<u>concentration, mg/L</u>				
	<u>7</u>	<u>15</u>	<u>16</u>	<u>22</u>	<u>23</u>
Arsenic	L/0.1	L/0.1	L/0.1	L/0.1	L/0.1
Barium	L/0.5	L/0.5	L/0.5	L/0.5	L/0.5
Cadmium	L/0.02	L/0.02	L/0.02	L/0.02	L/0.02
Chromium	L/0.1	L/0.1	L/0.1	L/0.1	L/0.1
Lead	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2



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	concentration, mg/L				
	12-A 7	6-A 15	6-B 16	8-A 22	8-B 23
Mercury	L/0.005	L/0.005	L/0.005	L/0.005	L/0.005
Selenium	L/0.1	L/0.1	L/0.1	L/0.1	L/0.1
Silver	L/0.1	L/0.1	L/0.1	L/0.1	L/0.1
Endrin	L/0.0002	L/0.0002	L/0.0002	L/0.0002	L/0.0002
Methoxychlor	L/0.001	L/0.001	L/0.001	L/0.001	L/0.001
Toxaphene	L/0.005	L/0.005	L/0.005	L/0.005	L/0.005
2,4-D	L/0.005	L/0.005	L/0.005	L/0.005	L/0.005
2,4,5-TP (silvex)	L/0.002	L/0.002	L/0.002	L/0.002	L/0.002
Lindane	L/0.0001	L/0.0001	L/0.0001	L/0.0001	L/0.0001

	concentration, mg/L				
	10-B 28	10-B' 29	12-B 36	14-B 42	MCL
Arsenic	L/0.1	L/0.1	L/0.1	L/0.1	5.0
Barium	L/0.5	L/0.5	L/0.5	L/0.5	100.
Cadmium	L/0.02	L/0.02	L/0.02	L/0.02	1.0
Chromium	L/0.1	L/0.1	L/0.1	L/0.1	5.0
Lead	L/0.2	L/0.2	L/0.2	L/0.2	5.0
Mercury	L/0.005	L/0.005	L/0.005	L/0.005	0.2
Selenium	L/0.01	L/0.01	L/0.01	L/0.01	1.0
Silver	L/0.1	L/0.1	L/0.1	L/0.1	5.0
Endrin	L/0.0002	L/0.0002	L/0.0002	L/0.0002	0.02
Methoxychlor	L/0.001	L/0.001	L/0.001	L/0.001	10.0
Toxaphene	L/0.005	L/0.005	L/0.005	L/0.005	0.5
2,4-D	L/0.005	L/0.005	L/0.005	L/0.005	10.0
2,4,5-TP (silvex)	L/0.002	L/0.002	L/0.002	L/0.002	1.0
Lindane	L/0.0001	L/0.0001	L/0.0001	L/0.0001	0.4



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Samples were analyzed also for Gravimetric Aromatic Hydrocarbons in accordance with Washington State Department of Ecology WAC 173-303. The method requires analysis of the sample through successive stages until the result obtained is less than 1% by weight (as received basis) or until the fourth stage has been completed. Results are as shown below:

Stage:	% by weight, as received basis*				
	12-A 7	6-A 15	6-B 16	8-A 22	8-B 23
1. Soxhlet Extraction	.22	.28	.32	.22	.084
	10-B 28	10-B' 29	12-B 36	14-B 42	
1. Soxhlet Extraction	.052	.082	.015	.19	

* for 4,5,6 membered rings

Samples were analyzed for priority pollutants in accordance with 40 CFR, Part 261, with results as shown below:

Inorganics	parts per million (mg/kg), dry basis				
	7	15	16	22	23
Antimony	L/0.5	L/0.5	L/0.5	L/0.5	L/0.5
Arsenic	21.	19.	15.	15.	20.
Beryllium	0.32	0.32	0.19	0.23	0.31
Cadmium	5.8	10.	6.1	2.2	3.5
Chromium	89.	300.	100.	44.	100.
Copper	110.	190.	91.	74.	130.
Lead	160.	350.	100.	110.	220.
Mercury	1.4	1.6	1.0	.39	1.1



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	parts per million (mg/kg), dry basis				
	12-A 7	6-A 15	6-B 16	8-A 22	8-B 23
Nickel	50.	58.	46.	40.	57.
Selenium	0.6	L/0.5	0.5	L/0.5	0.8
Silver	2.0	3.7	1.6	0.6	3.2
Thallium	L/0.5	L/0.5	L/0.5	L/0.5	L/0.5
Zinc	420.	550.	320.	240.	360.
Total Cyanide	5.6	1.3	0.6	L/0.5	0.7
Total Phenol	L/0.1	L/0.1	L/0.1	L/0.1	L/0.1

Volatile Organics (by GC/MS)

parts per billion (ug/kg), dry basis

Chloromethane	L/4.	L/4.	L/4.	L/4.	L/4.
Bromomethane	L/4.	L/4.	L/4.	L/4.	L/4.
Vinyl Chloride	L/4.	L/4.	L/4.	L/4.	L/4.
Chloroethane	L/4.	L/4.	L/4.	L/4.	L/4.
Methylene Chloride	240.	160.	180.	780.	290.
Acrolein	L/4.	L/4.	L/4.	L/4.	L/4.
*Acetone	1,100.	660.	L/20.	L/20.	L/20.
Acrylonitrile	L/4.	L/4.	L/4.	L/4.	L/4.
*Carbon Disulfide	L/4.	L/4.	L/4.	L/4.	L/4.
1,1-Dichloroethylene	L/4.	L/4.	L/4.	L/4.	L/4.
1,1-Dichloroethane	L/4.	L/4.	L/4.	L/4.	L/4.
trans-1,2-Dichloroethylene	L/4.	L/4.	L/4.	L/4.	L/4.
Chloroform	L/4.	L/4.	L/4.	L/4.	L/4.
*2-Butanone	L/4.	L/4.	L/4.	L/4.	L/4.
1,2-Dichloroethane	L/4.	L/4.	L/4.	L/4.	L/4.
1,1,1-Trichloroethane	L/4.	L/4.	L/4.	L/4.	L/4.
*Vinyl Acetate	L/4.	L/4.	L/4.	L/4.	L/4.
Bromodichloromethane	L/4.	L/4.	L/4.	L/4.	L/4.
Carbon Tetrachloride	L/4.	L/4.	L/4.	L/4.	L/4.
1,2-Dichloropropane	L/4.	L/4.	L/4.	L/4.	L/4.
Trichloroethylene	L/4.	L/4.	L/4.	L/4.	L/4.
Benzene	L/4.	L/4.	L/4.	L/4.	L/4.



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parts per billion (ug/kg), dry basis

	12-A 7	6-A 15	6-B 16	8-A 22	8-B 23
Chlorodibromomethane	L/4.	L/4.	L/4.	L/4.	L/4.
1,1,2-Trichloroethane	L/4.	L/4.	L/4.	L/4.	L/4.
2-Chloroethyl vinyl ether	L/4.	L/4.	L/4.	L/4.	L/4.
Bromoform	L/4.	L/4.	L/4.	L/4.	L/4.
*4-Methyl-2-pentanone	L/4.	L/4.	L/4.	L/4.	L/4.
*2-Hexanone	L/4.	L/4.	L/4.	L/4.	L/4.
1,1,2,2-Tetrachloroethane	L/4.	L/4.	10.	L/4.	L/4.
Tetrachloroethylene	L/4.	L/4.	L/4.	L/4.	L/4.
Toluene	20.	20.	50.	L/4.	50.
Chlorobenzene	L/4.	L/4.	L/4.	L/4.	L/4.
trans-1,3-Dichloropropene	L/4.	L/4.	L/4.	L/4.	L/4.
Ethylbenzene	60.	90.	10.	L/4.	L/4.
cis-1,3-Dichloropropene	L/4.	L/4.	L/4.	L/4.	L/4.
*Styrene	L/4.	L/4.	L/4.	L/4.	L/4.
*o-Xylene + p-Xylene	L/4.	L/4.	20.	L/4.	L/4.
**Fluorotrichloromethane	L/4.	L/4.	100.	L/4.	30.

Extractables (by GC/MS)

N-nitrosodimethylamine	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroethyl)ether	L/100.	L/100.	L/100.	L/100.	L/100.
2-Chlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
Phenol	L/100.	L/100.	L/100.	L/100.	L/100.
1,3-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
1,4-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
1,2-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroisopropyl)ether	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachloroethane	L/100.	L/100.	L/100.	L/100.	L/100.
N-nitroso-di-n-propylamine	L/100.	L/100.	L/100.	L/100.	L/100.
Nitrobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Isophorone	L/100.	L/100.	L/100.	L/100.	L/100.



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	12-A 7	6-A 15	6-B 16	8-A 22	8-B 23
2-Nitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dimethylphenol	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroethoxy)methane	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
1,2,4-Trichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Naphthalene	L/100.	L/100.	3,800.	630.	L/100.
Hexachlorobutadiene	L/100.	L/100.	L/100.	L/100.	L/100.
4-Chloro-m-cresol	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachlorocyclopentadiene	L/100.	L/100.	L/100.	L/100.	L/100.
2,4,6-Trichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
2-Chloronaphthalene	L/100.	L/100.	L/100.	L/100.	L/100.
Acenaphthylene	L/100.	L/100.	L/100.	L/100.	L/100.
Dimethylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.
2,6-Dinitrotoluene	L/100.	L/100.	L/100.	L/100.	L/100.
Acenaphthene	L/100.	L/100.	L/100.	2,040.	L/100.
2,4-Dinitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dinitrotoluene	L/100.	L/100.	L/100.	L/100.	L/100.
4-Nitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.
Fluorene	L/100.	L/100.	L/100.	L/100.	L/100.
4-Chlorophenyl phenyl ether	L/100.	L/100.	L/100.	L/100.	L/100.
Diethylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.
4,6-Dinitro-o-cresol	L/100.	L/100.	L/100.	L/100.	L/100.
1,2-Diphenylhydrazine	L/100.	L/100.	L/100.	L/100.	L/100.
4-Bromophenyl phenyl ether	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Pentachlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
Phenanthrene	8,400.	L/100.	L/100.	2,990.	L/100.
Anthracene	1,500.	L/100.	L/100.	1,350.	L/100.
Dibutylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.
Fluoranthene	15,100.	L/100.	L/100.	6,130.	L/100.
Pyrene	L/100.	L/100.	L/100.	4,440.	L/100.
Benzidine	L/100.	L/100.	L/100.	L/100.	L/100.



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parts per billion (ug/kg), dry basis

	12-A <u>7</u>	6-A <u>15</u>	6-B <u>16</u>	8-A <u>22</u>	8-B <u>23</u>
Butyl benzyl phthalate	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(a)anthracene	L/100.	L/100.	L/100.	L/100.	L/100.
Chrysene	L/100.	L/100.	L/100.	L/100.	L/100.
3,3'-Dichlorobenzidine	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-ethylhexyl)phthalate	4,200.	3,600.	2,600.	2,100.	2,600.
N-nitrosodiphenylamine	L/100.	L/100.	L/100.	L/100.	L/100.
Di-n-octyl phthalate	L/100.	510.	L/100.	630.	L/100.
Benzo(b)fluoranthene	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(k)fluoranthene	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(a)pyrene	L/100.	L/100.	L/100.	L/100.	L/100.
Indeno(1,2,3-cd)pyrene	L/100.	L/100.	L/100.	L/100.	L/100.
Dibenzo(ah)anthracene	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(ghi)perylene	L/100.	L/100.	L/100.	L/100.	L/100.
2,3,7,8-Tetrachlorodibenzo- p-dioxin (TCDD)	L/100.	L/100.	L/100.	L/100.	L/100.
*Aniline	L/100.	L/100.	L/100.	L/100.	L/100.
*Benzoic Acid	L/100.	L/100.	L/100.	L/100.	L/100.
*Benzyl Alcohol	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Chloroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*Dibenzofuran	L/100.	L/100.	L/100.	1,530.	L/100.
*2-Methylnaphthalene	L/100.	L/100.	L/100.	L/100.	L/100.
*2-Methylphenol	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Methylphenol	L/100.	L/100.	L/100.	L/100.	L/100.
*2-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*3-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*2,4,5-Trichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.



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parts per billion (ug/kg), dry basis

Pesticides (by GC/ECD)	12-A 7	6-A 15	6-B 16	8-A 22	8-B 23
alpha-BHC	L/5.	L/5.	L/5.	L/5.	L/5.
beta-BHC	L/5.	L/5.	L/5.	L/5.	L/5.
delta-BHC	L/5.	L/5.	L/5.	L/5.	L/5.
gamma-BHC (lindane)	L/5.	L/5.	L/5.	L/5.	L/5.
heptachlor	L/5.	L/5.	L/5.	L/5.	10.
aldrin	L/5.	L/5.	L/5.	L/5.	L/5.
heptachlor epoxide	L/5.	L/5.	L/5.	L/5.	L/5.
dieldrin	L/5.	L/5.	L/5.	L/5.	L/5.
4,4°-DDE	L/5.	L/5.	L/5.	L/5.	L/5.
4,4°-DDD	120.	170.	80.	L/10.	50.
endosulfan sulfate	L/10.	40.	L/10.	L/10.	40.
4,4°-DDT	40.	L/10.	15.	L/10.	30.
chlordane	L/10.	L/10.	L/10.	L/10.	L/10.
alpha endosulfan	L/10.	L/10.	L/10.	L/10.	L/10.
beta endosulfan	L/10.	L/10.	L/10.	L/10.	L/10.
endrin	L/10.	L/10.	L/10.	L/10.	L/10.
endrin aldehyde	L/10.	L/10.	L/10.	L/10.	L/10.
toxaphene	L/400.	L/400.	L/400.	L/400.	L/400.
PCB 1016	L/100.	L/100.	L/100.	L/100.	L/100.
PCB 1221	L/100.	L/100.	L/100.	L/100.	L/100.
PCB 1232	L/100.	L/100.	L/100.	L/100.	L/100.
PCB 1242	1,100.	970.	580.	L/100.	540.
PCB 1248	L/100.	L/100.	L/100.	L/100.	L/100.
PCB 1254	L/100.	L/100.	L/100.	L/100.	L/100.
PCB 1260	4,100.	5,640.	1,600.	1,200.	3,200.



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parts per million (mg/kg), dry basis

Inorganics

	<u>10-B</u> <u>28</u>	<u>10-B'</u> <u>29</u>	<u>12-B</u> <u>36</u>	<u>14-B</u> <u>42</u>
Antimony	L/0.5	L/0.5	L/0.5	L/0.5
Arsenic	16.	5.1	2.2	10.
Beryllium	0.24	0.13	0.07	0.14
Cadmium	2.2	0.7	0.4	1.5
Chromium	50.	17.	18.	30.
Copper	98.	34.	10.	47.
Lead	150.	66.	2.7	62.
Mercury	0.89	0.22	L/0.05	0.66
Nickel	44.	17.	2.5	30.
Selenium	0.5	L/0.5	L/0.5	L/0.5
Silver	1.6	0.5	L/0.2	0.5
Thallium	L/0.5	L/0.5	L/0.5	L/0.5
Zinc	250.	92.	36.	150.
Total Cyanide	0.6	L/0.5	L/0.5	L/0.5
Total Phenol	L/0.1	L/0.1	L/0.1	L/0.1

Volatile Organics (by GC/MS)

parts per billion (ug/kg), dry basis

	<u>L/4.</u>	<u>L/3.</u>	<u>L/3.</u>	<u>L/3.</u>	<u>L/1.</u>
Chloromethane	L/4.	L/3.	L/3.	L/3.	L/1.
Bromomethane	L/4.	L/3.	L/3.	L/3.	L/1.
Vinyl Chloride	L/4.	L/3.	L/3.	L/3.	L/1.
Chloroethane	L/4.	L/3.	L/3.	L/3.	L/1.
Methylene Chloride	150.	230.	140.	340.	L/1.
Acrolein	L/4.	L/3.	L/3.	L/3.	L/1.
*Acetone	L/20.	L/10.	320.	220.	L/1.
Acrylonitrile	L/4.	L/3.	L/3.	L/3.	L/1.
*Carbon Disulfide	L/4.	L/3.	L/3.	L/3.	L/1.
1,1-Dichloroethylene	L/4.	L/3.	L/3.	L/3.	L/1.
1,1-Dichloroethane	L/4.	L/3.	L/3.	L/3.	L/1.
trans-1,2-Dichloroethylene	L/4.	L/3.	L/3.	L/3.	L/1.
Chloroform	L/4.	L/3.	L/3.	L/3.	L/1.



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parts per billion (ug/kg), dry basis

	10-B	10-B'	12-B	14-B	Method
	28	29	36	42	Blank
*2-Butanone	L/4.	L/3.	L/3.	L/3.	L/1.
1,2-Dichloroethane	L/4.	L/3.	L/3.	L/3.	L/1.
1,1,1-Trichloroethane	L/4.	L/3.	L/3.	L/3.	L/1.
*Vinyl Acetate	L/4.	L/3.	L/3.	L/3.	L/1.
Bromodichloromethane	L/4.	L/3.	L/3.	L/3.	L/1.
Carbon Tetrachloride	L/4.	L/3.	L/3.	L/3.	L/1.
1,2-Dichloropropane	L/4.	L/3.	L/3.	L/3.	L/1.
Trichloroethylene	L/4.	L/3.	L/3.	L/3.	L/1.
Benzene	L/4.	L/3.	L/3.	L/3.	L/2.
Chlorodibromomethane	L/4.	L/3.	L/3.	L/3.	L/1.
1,1,2-Trichloroethane	L/4.	L/3.	L/3.	L/3.	L/1.
2-Chloroethyl vinyl ether	L/4.	L/3.	L/3.	L/3.	L/1.
Bromoform	L/4.	L/3.	L/3.	L/3.	L/1.
*4-Methyl-2-pentanone	L/4.	L/3.	L/3.	L/3.	L/1.
*2-Hexanone	L/4.	L/3.	L/3.	L/3.	L/1.
1,1,2,2-Tetrachloroethane	L/4.	L/3.	L/3.	L/3.	L/1.
Tetrachloroethylene	L/4.	L/3.	L/3.	L/3.	L/1.
Toluene	10.	5.	3.	5.	L/1.
Chlorobenzene	L/4.	L/3.	L/3.	L/3.	L/1.
trans-1,3-Dichloropropene	L/4.	L/3.	L/3.	L/3.	L/1.
Ethylbenzene	L/4.	L/3.	L/3.	L/3.	L/1.
cis-1,3-Dichloropropene	L/4.	L/3.	L/3.	L/3.	L/1.
*Styrene	L/4.	L/3.	L/3.	L/3.	L/1.
*o-Xylene + p-Xylene	L/4.	L/3.	L/3.	L/3.	L/1.
**Fluorotrichloromethane	70.	30.	10.	40.	L/1.



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parts per billion (ug/kg), dry basis

Extractables (by GC/MS)	10-B 28	10-B' 29	12-B 36	14-B 42	Method Blank
N-nitrosodimethylamine	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroethyl)ether	L/100.	L/100.	L/100.	L/100.	L/100.
2-Chlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
Phenol	L/100.	L/100.	L/100.	L/100.	L/100.
1,3-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
1,4-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
1,2-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroisopropyl)ether	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachloroethane	L/100.	L/100.	L/100.	L/100.	L/100.
-nitroso-di-n-propylamine	L/100.	L/100.	L/100.	L/100.	L/100.
Nitrobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Isophorone	L/100.	L/100.	L/100.	L/100.	L/100.
2-Nitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dimethylphenol	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroethoxy)methane	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
1,2,4-Trichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Naphthalene	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachlorobutadiene	L/100.	L/100.	L/100.	L/100.	L/100.
4-Chloro-m-cresol	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachlorocyclopentadiene	L/100.	L/100.	L/100.	L/100.	L/100.
2,4,6-Trichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
2-Chloronaphthalene	L/100.	L/100.	L/100.	L/100.	L/100.
Acenaphthylene	L/100.	L/100.	L/100.	L/100.	L/100.
Dimethylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.
2,6-Dinitrotoluene	L/100.	L/100.	L/100.	L/100.	L/100.
Acenaphthene	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dinitrophenol	1,370.	440.	L/100.	L/100.	L/100.
2,4-Dinitrotoluene	L/100.	L/100.	L/100.	L/100.	L/100.
4-Nitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.
Fluorene	L/100.	L/100.	L/100.	L/100.	L/100.
4-Chlorophenyl phenyl ether	L/100.	L/100.	L/100.	L/100.	L/100.



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Chemistry, Microbiology, and Technical Services



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LABORATORY NO.

85194

parts per billion (ug/kg), dry basis

	10-B 28	10-B 29	12-B 36	14-B 42	Method Blank
Diethylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.
4,6-Dinitro-o-cresol	L/100.	L/100.	L/100.	L/100.	L/100.
1,2-Diphenylhydrazine	L/100.	L/100.	L/100.	L/100.	L/100.
4-Bromophenyl phenyl ether	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Pentachlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
Phenanthrene	3,690.	L/100.	L/100.	L/100.	L/100.
Anthracene	1,290.	L/100.	L/100.	L/100.	L/100.
Dibutylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.
Fluoranthene	9,200.	L/100.	L/100.	L/100.	L/100.
Pyrene	L/100.	L/100.	L/100.	L/100.	L/100.
Benzidine	L/100.	L/100.	L/100.	3,670.	L/100.
Butyl benzyl phthalate	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(a)anthracene	L/100.	L/100.	L/100.	L/100.	L/100.
Chrysene	L/100.	L/100.	L/100.	L/100.	L/100.
3,3°-Dichlorobenzidine	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-ethylhexyl)phthalate	1,800.	3,200.	1,390.	L/100.	L/100.
N-nitrosodiphenylamine	L/100.	L/100.	L/100.	L/100.	L/100.
Di-n-octyl phthalate	L/100.	L/100.	670.	L/100.	L/100.
Benzo(b)fluoranthene	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(k)fluoranthene	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(a)pyrene	L/100.	L/100.	L/100.	L/100.	L/100.
Indeno(1,2,3-cd)pyrene	L/100.	L/100.	L/100.	L/100.	L/100.
Dibenzo(ah)anthracene	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(ghi)perylene	L/100.	L/100.	L/100.	L/100.	L/100.
2,3,7,8-Tetrachlorodibenzo- p-dioxin (TCDD)	L/100.	L/100.	L/100.	L/100.	L/100.
*Aniline	L/100.	L/100.	L/100.	L/100.	L/100.
*Benzoic Acid	L/100.	L/100.	L/100.	L/100.	L/100.
*Benzyl Alcohol	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Chloroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*Dibenzofuran	L/100.	L/100.	L/100.	L/100.	L/100.



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parts per billion (ug/kg), dry basis

	10-B 28	10-B' 29	12-B 36	14-B 42	Method Blank
*2-Methylnaphthalene	L/100.	L/100.	L/100.	L/100.	L/100.
*2-Methylphenol	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Methylphenol	L/100.	L/100.	L/100.	L/100.	L/100.
*2-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*3-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*2,4,5-Trichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.

Pesticides (by GC/ECD)

alpha-BHC	L/5.	L/5.	L/5.	L/5.
beta-BHC	L/5.	L/5.	L/5.	L/5.
delta-BHC	L/5.	L/5.	L/5.	L/5.
gamma-BHC (lindane)	L/5.	L/5.	L/5.	L/5.
heptachlor	L/5.	L/5.	L/5.	L/5.
aldrin	L/5.	L/5.	L/5.	L/5.
heptachlor epoxide	L/5.	L/5.	L/5.	L/5.
dieldrin	L/5.	L/5.	L/5.	L/5.
4,4'-DDE	15.	L/5.	L/5.	L/5.
4,4'-DDD	90.	L/10.	L/10.	20.
endosulfan sulfate	L/10.	L/10.	L/10.	L/10.
4,4'-DDT	L/10.	L/10.	L/10.	L/10.
chlordane	L/10.	L/10.	L/10.	L/10.
alpha endosulfan	L/10.	L/10.	L/10.	L/10.
beta endosulfan	L/10.	L/10.	L/10.	L/10.
endrin	L/10.	L/10.	L/10.	L/10.
endrin aldehyde	L/10.	L/10.	L/10.	L/10.



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	parts per billion (ug/kg), dry basis			
	10-B 28	10-B 29	12-B 36	14-B 42
toxaphene	L/400.	L/400.	L/400.	L/400.
PCB 1016	L/100.	L/100.	L/100.	L/100.
PCB 1221	L/100.	L/100.	L/100.	L/100.
PCB 1232	L/100.	L/100.	L/100.	L/100.
PCB 1242	L/100.	L/100.	L/100.	L/100.
PCB 1248	L/100.	L/100.	L/100.	L/100.
PCB 1254	L/100.	L/100.	100.	L/100.
PCB 1260	3,100.	1,000.	L/100.	200.

Key

L/ indicates "less than"

MCL=Maximum Contamination Level allowed per regulation.

*Additional compounds from the EPA's Hazardous Substances List.

**Other compounds of interest identified, in estimated amounts.

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens
J. M. Owens

JMO:rtv



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II. SECOND SERIES DATA ONLY

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CLIENT Port of Seattle
P.O. Box 2309
Seattle, WA 98111
ATTN: Doug Hotchkiss

LABORATORY NO. 86772

DATE Oct. 31, 1984

PO # P-03613

REPORT ON SPOILS

SAMPLE IDENTIFICATION

Samples which were on hold were released for analysis on Sept. 21, 1984. Samples were assigned new laboratory number 86772-1/9. Samples had previously been identified by Laucks Testing Laboratories and Hart Crowser & Associates as shown below:

TESTS PERFORMED AND RESULTS:

	Boring	Sample	LTL #	HC #	Criteria	Disposal Method
1)	HC-13	C	85194-37	1351	Pass	Open
2)			85194-38	1352		
3)			85194-11	1352B	Fail	Contained
4)	HC-13	B	85194-12	1353		
5)	HC-10	C	85194-30	1054	Pass	
6)			85194-33	953	Pass	Open
7)	HC-9	B	85194-34	954		
8)	HC-7	B	85194-19	752	Fail	Contained
9)	HC-7	C	85194-20	753	Fail	Contained

Three composite samples were created by homogeneously mixing equal weight portions from the indicated samples.

Composite A: Samples 1, 2 above

Composite B: Samples 3, 4 above

Composite C: Samples 6, 7 above

Samples 5, 8, and 9 were analyzed without compositing.

Samples were passed through a No. 10 sieve prior to analysis. Only material passing the sieve was analyzed. Percentages retained were as follow:

	13-C A	13-B B	9-B C	10-C 5	7-B 8	7-C 9
% retained	L/2.	5.	L/2.	L/2.	L/2.	16.
major description	---	wood	---	---	---	rocks
minor description	---	rocks	---	---	---	wood



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Routine analyses were then performed on the samples, with results as follow:

	13-C A	13-B B	9-B C	10-C 5	7-B 8	7-C 9
	%, as received basis					
Total Solids	77.8	60.8	69.9	78.3	44.6	53.5
	%, dry basis					
Total Organic Carbon	0.2	4.0	1.5	0.5	3.8	4.0
Total Volatile Solids	1.3	7.4	3.1	1.4	11.5	6.6
Oil & Grease	0.07	0.88	0.25	0.02	2.0	0.98
Sulfide as S	0.003	L/0.001	0.002	L/0.001	0.33	0.10

Grain Size Analysis

Sand	90.2	35.3	65.7	88.6	10.8	8.8
Silt	9.8	46.6	27.2	9.4	70.4	60.1
Clay	L/0.1	18.1	7.1	2.0	18.8	31.1

Samples were analyzed for priority pollutants in accordance with 40 CFR, part 136, with results as shown below:

Inorganics

parts per million (mg/kg), dry basis

Antimony	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Arsenic	3.1	19.	4.0	2.2	23.	15.
Beryllium	0.16	0.33	0.21	0.13	0.22	0.50
Cadmium	0.2	3.2	0.5	0.1	7.4	4.8
Chromium	15.	49.	18.	10.	110.	92.
Copper	14.	97.	26.	15.	200.	150.
Lead	18.	170.	40.	33.	340.	190.
Mercury	0.2	1.1	0.2	L/0.1	1.6	0.9
Nickel	9.	36.	20.	10.	61.	92.
Selenium	L/0.5	0.5	L/0.5	L/0.5	1.5	0.5



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	<u>13-C</u> <u>A</u>	<u>13-B</u> <u>B</u>	<u>9-B</u> <u>C</u>	<u>10-C</u> <u>5</u>	<u>7-B</u> <u>8</u>	<u>7-C</u> <u>9</u>
	<u>parts per million (mg/kg), dry basis</u>					
Silver	0.24	2.5	0.21	L/0.05	3.4	1.9
Thallium	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Zinc	38.	320.	80.	27.	700.	970.
Total Cyanide	L/0.10	0.32	L/0.10	L/0.10	0.60	0.24
Total Phenol	L/0.15	L/0.15	L/0.15	L/0.15	L/0.15	L/0.15

~ Volatile Organics (by GC/MS)

parts per billion (ug/kg)

	<u>A</u>	<u>B</u>	<u>C</u>	<u>5</u>	<u>8</u>	<u>9</u>	<u>Method</u> <u>Blank</u>
Chloromethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Bromomethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Vinyl Chloride	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Chloroethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Methylene Chloride	368.	828.	646.	394.	360.	1040.	tr
Acrolein	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.
*Acetone	455.	939.	316.	330.	334.	313.	18.
Acrylonitrile	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.	L/10.
*Carbon Disulfide	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
1,1-Dichloroethylene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
1,1-Dichloroethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
trans-1,2-Dichloroethylene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Chloroform	L/10.	L/10.	tr	L/10.	tr	L/10.	L/10.
*2-Butanone	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
1,2-Dichloroethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
1,1,1-Trichloroethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
*Vinyl Acetate	L/10.	L/10.	tr	L/10.	L/10.	L/10.	L/10.
Bromodichloromethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.



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	parts per billion (ug/kg)						Method Blank
	<u>13-C</u> A	<u>13-B</u> B	<u>9-B</u> C	<u>10-C</u> 5	<u>7-B</u> 8	<u>7-C</u> 9	
Carbon Tetrachloride	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
1,2-Dichloropropane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Trichloroethylene	L/10.	L/10.	tr	L/10.	L/10.	L/10.	L/10.
Benzene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Chlorodibromomethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
1,1,2-Trichloroethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
2-Chloroethyl vinyl ether	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Bromoform	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
*4-Methyl-2-pentanone	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
*2-Hexanone	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	tr
1,1,2,2-Tetrachloroethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	tr
Tetrachloroethylene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Toluene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Chlorobenzene	L/10.	L/10.	L/10.	L/10.	tr	L/10.	L/10.
trans-1,3-Dichloropropene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Ethylbenzene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
cis-1,3-Dichloropropene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Styrene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
o-Xylene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.

tr = 1-10 ug/kg



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Extractables (by GC/MS)

parts per billion (ug/kg)

	<u>13-C</u> <u>A</u>	<u>13-B</u> <u>B</u>	<u>9-B</u> <u>C</u>	<u>10-C</u> <u>5</u>	<u>7-B</u> <u>8</u>	<u>7-C</u> <u>9</u>	<u>Method</u> <u>Blank</u>
N-nitrosodimethylamine	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroethyl)ether	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
2-Chlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Phenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
1,3-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
1,4-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
1,2-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroisopropyl)ether	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachloroethane	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
N-nitroso-di-n-propylamine	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Nitrobenzene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Isophorone	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
2-Nitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dimethylphenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroethoxy)methane	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
1,2,4-Trichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Naphthalene	L/100.	380.	tr	tr	190.	280.	L/100.
Hexachlorobutadiene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
4-Chloro-m-cresol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachlorocyclopentadiene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.



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LABORATORY NO. 86772

	parts per billion (ug/kg)						Method Blank
	13-C A	13-B B	9-B C	10-C 5	7-B 8	7-C 9	
2,4,6-Trichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
2-Chloronaphthalene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Acenaphthylene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Dimethylphthalate	L/100.	L/100.	L/100.	L/100.	160.	L/100.	L/100.
2,6-Dinitrotoluene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Acenaphthene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dinitrophenol	L/100.	L/100.	L/100.	L/100.	120.	490.	L/100.
2,4-Dinitrotoluene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
4-Nitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Fluorene	L/100.	210.	L/100.	L/100.	L/100.	L/100.	L/100.
4-Chlorophenyl phenyl ether	L/100.	L/100.	L/100.	L/100.	130.	590.	L/100.
Diethylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
4,6-Dinitro-o-cresol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
1,2-Diphenylhydrazine	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
4-Bromophenyl phenyl ether	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Pentachlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Phenanthrene	150.	910.	200.	L/100.	580.	1620.	L/100.
Anthracene	100.	1180.	240.	L/100.	880.	650.	L/100.
Dibutylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Fluoranthene	480.	5950.	520.	L/100.	6370.	3910.	L/100.
Pyrene	340.	5580.	330.	L/100.	3790.	2560.	L/100.
Benzidine	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.



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PAGE NO. 7

Port of Seattle

LABORATORY NO. 87662

	parts per billion (ug/kg)						Method Blank
	13-C A	13-B B	9-B C	10-C 5	7-B 8	7-C 9	
Butyl benzyl phthalate	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(a)anthracene	180.	2110.	140.	L/100.	1570.	1040.	L/100.
Chrysene	200.	2200.	160.	L/100.	1620.	1070.	L/100.
3,3'-Dichlorobenzidine	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-ethylhexyl)phthalate	2390.	2550.	780.	460.	4760.	L/100.	L/100.
N-nitrosodiphenylamine	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Di-n-octyl phthalate	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(b)fluoranthene	320.	2200.	160.	L/100.	2330.	1270.	L/100.
Benzo(k)fluoranthene	**	**	**	**	**	**	**
Benzo(a)pyrene	260.	1580.	360.	L/100.	1480.	1180.	L/100.
Indeno(1,2,3-cd)pyrene	L/100.	630.	L/100.	L/100.	L/100.	L/100.	L/100.
Dibenzo(ah)anthracene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(ghi)perylene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
2,3,7,8-Tetrachlorodibenzo- p-dioxin (TCDD)	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*Aniline	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*Benzoic Acid	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*Benzyl Alcohol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Chloroaniline	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*Dibenzofuran	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*2-Methylnaphthalene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*2-Methylphenol	L/100.	L/100.	L/100.	L/100.	110.	L/100.	L/100.
*4-Methylphenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.



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PAGE NO. 8

Port of Seattle

LABORATORY NO. 86772

	parts per billion (ug/kg)						Method Blank
	13-C A	13-B B	9-B C	10-C 5	7-B 8	7-C 9	
*2-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*3-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*2,4,5-Trichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.

tr = 50-100 ug/kg

	A	B	C	5	8	9
Pesticides (by GC/ECD)						
	parts per billion (ug/kg)					
alpha-BHC	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
beta-BHC	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
delta-BHC	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
gamma-BHC (lindane)	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
heptachlor	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
aldrin	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
heptachlor epoxide	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
dieldrin	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
4,4'-DDE	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
4,4'-DDD	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
endosulfan sulfate	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
4,4'-DDT	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
chlordane	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
alpha endosulfan	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
beta endosulfan	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
endrin	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
endrin aldehyde	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
toxaphene	L/50.	L/50.	L/50.	L/50.	L/50.	L/50.



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PAGE NO. 9

Port of Seattle

LABORATORY NO. 86772

<u>13-C</u> <u>A</u>	<u>13-B</u> <u>B</u>	<u>9-B</u> <u>C</u>	<u>10-C</u> <u>5</u>	<u>7-B</u> <u>8</u>	<u>7-C</u> <u>9</u>
-------------------------	-------------------------	------------------------	-------------------------	------------------------	------------------------

parts per billion (ug/kg)

PCB 1016	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1221	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1232	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1242	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1248	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1254	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1260	66.	120.	L/20.	L/20.	140.	150.

Key

L/ indicates "less than".

* Additional compounds from the EPA's Hazardous Substances List.

** Value shown for Benzo(b)fluoranthene is the sum of the isomers Benzo(b)fluoranthene and Benzo(k)fluoranthene.

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J.M. Owens
J.M. Owens

JMO:veg



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ANALYSIS REPORT

III. T-32 and P-28 DATA AND (QA/QC)

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4900 9TH AVENUE N.W., • SEATTLE, WASHINGTON 98107-3697 • 206/783-4700

CLIENT: Port of Seattle

DATE RECEIVED: 10/8/84

REPORT TO: Mr. Doug Hotchkiss

DATE REPORTED: 12/7/84

LABORATORY SAMPLE NUMBER - CLIENT IDENTIFICATION CROSS REFERENCE

Laboratory Sample No.		Port of Seattle Identification			Criteria	Disposal Method
		Boring (Stat) Sample (D)				
81286	P-28 B+C	A	A & D Composite		Fail	Contain.
81287	" B	B	B		Fail*	"
81288	" B	C	C		" *	"
81289	" B	D	E		" *	"
81290	T-32 10	D+E	F & G Composite		Pass	Open
81291	" 13	D	H		"	"
81292	" 13	E	I		"	"
81293	" 6	C	J		"	"
81294	" 6	D	K		"	"
81295	" 7	E	M		"	"
81296	" 7	E	M ¹		"	"
81297	" 7	F	N		"	"
81298	" 9	C	O		"	"
81299	" 9	D	P		"	"
81300	" 12	C	S		"	"
81301	" 12	D+E	T & U Composite		"	"
81302	P-28 A	B	W		Fail*	Contain.

* These failures are a result of bioassays.
The chemistry values pass the 4-mile Rock
disposal site criteria.



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CLIENT: Port of Seattle

DATE RECEIVED: 10/8/84

REPORT TO: Doug Hotchkiss

DATE REPORTED: 12/7/84

Laboratory Sample Number	Terminal 30 Expansion Sediment Analysis				AGREEMENT # P-03611				
	PIER 22				T-32				
Client Identification	81286 A & D Composite B+C-A	81287 B B-B	81288 C B-C	81289 E B-D	81290 F & G Composite HC 10-D+E	81291 H HC-13-D	81292 I HC-13 E	81293 J HC-6-C	81294 K HC-6-D
Antimony (µg/g)	1.47	<0.150	<0.150	<0.150	<0.150 <0.150]	<0.150	<0.150	<0.150	<0.150
Arsenic (µg/g)	11.	1.7 1.4]	7.1	7.4	5.0	5.0 4.5]	3.2	3.8	2.9
Beryllium (µg/g)	1.07	0.954	0.907	1.23	0.796 0.946]	1.04	0.971	0.842	0.924
Cadmium (µg/g)	7.21	0.753	0.648	0.856	1.16 0.701]	0.664	0.755	0.711	0.650
Chromium (µg/g)	82.8	22.8	25.7	23.2	28.3 24.6]	20.9	17.3	20.0	14.8
Copper (µg/g)	111.	22.1	17.5	23.4	19.5 20.9]	17.1	13.2	20.5	11.7
Lead (µg/g)	153.	1.15	1.08	2.52	1.59 1.19]	6.01	8.36	52.6	1.10
Mercury (µg/g)	0.16 0.17]	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Nickel (µg/g)	38.6	15.8	13.8	18.9	29.5 19.7]	13.9	12.7	12.1	11.2
Selenium (µg/g)	0.272	0.088 0.087]	0.129	0.139	<0.060	<0.060 <0.060]	<0.060	<0.060	<0.060
Silver (µg/g)	31.3	0.853	0.799	0.982	1.45	0.981	0.985	0.816	0.875
Thallium (µg/g)	16.6	9.79	11.4	9.07	10.5 9.85]	9.81	8.09	8.42	5.60

*All results reported on a dry weight basis.

Continued



CLIENT: Port of Seattle
REPORT TO: Doug Hotchkiss

DATE RECEIVED: 10/8/84
DATE REPORTED: 12/7/84
AGREEMENT# P-03661

Laboratory Sample Number	Terminal 30 Expansion Sediment Analysis PIER 28				T-32				
	81286	81287	81288	81289	81290	81291	81292	81293	81294
Client Identification	A & D Composite B+C-A	B B-B	C B-C	E B-D	F & G Composite D-D+E	H 13-D	I 13-E	J 6-C	K 6-D
Zinc (µg/g)	567.	42.4	35.4	45.1	41.2 43.7]	36.4	33.2	36.6	32.5
Cyanide (µg/g)	<1.1	<1.1] <1.1]	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
Phenol (µg/g)	<1.5	<1.5] <1.5]	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	1.7
Oil & Grease (µg/g)	35200.	290.	<75.	<75.	120.	2940.	800.	457. 336.]	296.
Total Solids (%)	57.49	76.40	75.74	74.74	78.04	75.96	76.19	78.65	79.30
Total Volatile Solids (%)	9.01	2.00	2.41	2.39	2.01	2.48	2.58	1.57	1.26
Total Organic Carbon (%)	2.49	0.50	0.46	0.46	0.38	0.66	0.79	0.17	0.27
Sulfides (µg/g)	454.	<7.	<7.	19.	33.	71.	48.	10.	16.

*All results reported on a dry weight basis.



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CLIENT: Port of Seattle

DATE RECEIVED: 10/8/84

REPORT TO: Doug Hotchkiss

DATE REPORTED: 12/7/84

Terminal 30 Expansion Sediment Analysis

AGREEMENT # P-03611

Laboratory Sample Number	81295	81296	81297	81298	81299	81300	81301	81302
Client Identification	M 7-E	M ¹ 7-E	N 7-F	O 9-C	P 9-D	S 12-C	T & U Composite 12-D+E	W A-B
Antimony (µg/g)	<0.150	<0.150	<0.150] <0.150]	<0.150	<0.150	<0.150	<0.150	<0.150] <0.150]
Arsenic (µg/g)	3.4	4.0	5.2	1.7	4.7	2.4	3.9] 4.5]	3.5
Beryllium (µg/g)	0.572	0.785	1.05] 0.899]	0.725	1.12	0.875	1.01	0.791] 0.587]
Cadmium (µg/g)	0.532	0.829	1.26] 0.863]	0.819	0.699	0.797	0.838	0.741
Chromium (µg/g)	16.4	18.8	17.5] 14.7]	18.7	25.1	31.5	20.1	16.5] 17.6]
Copper (µg/g)	12.2	13.3	16.7] 17.0]	12.4	15.0	41.0	16.2	13.3
Lead (µg/g)	1.97	2.18	4.28	4.45	3.24	3.89	4.47	1.30] 1.27]
Mercury (µg/g)	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Nickel (µg/g)	12.4	15.7	28.0] 19.1]	15.0	15.2	23.5	15.6	13.2] 13.5]
Selenium (µg/g)	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060] <0.060]	<0.060
Silver (µg/g)	0.788	0.785	1.02	0.796	0.849	0.622	1.03	1.12
Thallium (µg/g)	5.72	8.72	8.36] 7.28]	6.79	7.89	5.64	8.38	8.87] 9.71]

*All results reported on a dry weight basis.

Continued.



CLIENT: Port of Seattle

DATE RECEIVED: 10/8/84

REPORT TO: Doug Hotchkiss

DATE REPORTED: 12/7/84

Terminal 30 Expansion
Sediment Analysis

AGREEMENT # P-03611

Laboratory Sample Number	81295	81296	81297	81298	81299	81300	81301	81302
Client Identification	M 7-E	M ¹ 7-E	N 7-F	O 9-C	P 9-D	S 12-C	T & U Composite 12-D+E	W A-B
Zinc (µg/g)	34.3	34.7	40.2 47.2]	36.0	38.7	36.4	35.5	36.9 36.8]
Cyanide (µg/g)	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
Phenol (µg/g)	<1.5	<1.5	<1.5	<1.5	<1.5 1.5]	<1.5	<1.5	<1.5
Oil & Grease (µg/g)	267.	692.	<75. 108.]	871.	545.	1100.	<75.	431. 657.]
Total Solids (%)	78.54	78.09 77.79]	79.02	80.30	77.12	79.45	77.79	77.75 77.50]
Total Volatile Solids (%)	1.44	1.41 1.59]	1.76	1.01	2.09	0.86	1.84	2.23 2.13]
Total Organic Carbon (%)	0.32	0.28	0.53	0.12	0.45	0.087	0.48	0.32
Sulfides (µg/g)	47.	39.	21.	11.	22.	9.	22.	46.

*All results reported on a dry weight basis.



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CLIENT: Port of Seattle

DATE REPORTED: 12/7/84

REPORT TO: Doug Hotchkiss

Pesticide & PCB Analysis

Laboratory Sample #

*

81286 **

Client Identification

A & D Composite
P-28 B+C-A

<u>Parameter</u>	<u>Detection Limit (µg/g)</u>	<u>Concentration (µg/g)</u>
Aldrin	0.001	<.005
Dieldrin	0.001	<.010
p,p-DDT	0.002	<.03
p,p-DDE	0.001	<.010
p,p-DDD	0.002	<.03
Endosulfan I	0.001	<.010
Endosulfan II	0.001	<.010
Endosulfan Sulfate	0.002	<.03
Endrin	0.001	<.010
Endrin Aldehyde	0.002	<.03
Heptachlor	0.001	<.005
Heptachlorepoxyde	0.001	<.005
a-BHC	0.001	<.005
B-BHC	0.001	<.005
G-BHC	0.001	<.005
D-BHC	0.001	<.005
Toxaphene	0.10	<0.10
Chlorodane	0.020	<0.020
PCB's (all isomers)	0.010	0.223 (A-1260)

*All samples (81287 - 81302) below listed detection limits except 81286.

**Sample 81286 Detection Limits for Pesticides are higher than the regular limits because of the presence of the PCB's.

°Results on a dry weight basis.

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CLIENT: Port of Seattle
 REPORT TO: Mr. Doug Hotchkiss

DATE RECEIVED: 10/8/84
 DATE REPORTED: 12/7/84
 AGREEMENT # P-03611

HPLC ANALYSIS OF SEDIMENTS FOR POLYNUCLEAR AROMATICS

Laboratory Sample No.	P-28				T-32	Detection Limit
	81286	81287	81288	81289	82190	
Client Identification	A & D Composite B+C-A	B B-B	C B-C	E B-D	F & G Composite D+E	
<u>Parameters</u>						
Naphthalene	ND	ND	ND	ND	ND	50.
Acenaphthylene	1690.	110.	ND	ND	ND	80.
Fluorene Acenaphthene]*	2230.	ND	ND	ND	ND	80.
Phenanthrene	1320.	ND	ND	ND	ND	10.
Anthracene	520.	ND	ND	ND	ND	10.
Fluoranthene	2440.	ND	ND	ND	ND	25.
Pyrene	ND	ND	ND	ND	ND	30.
Benz(a)anthracene]* Chrysene	450.	ND	ND	ND	ND	15.
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	20.
Benzo(k)fluoranthene	1110.	ND	ND	ND	205.	20.
Benzo(a)pyrene	120.	ND	ND	ND	ND	25.
Dibenz(a,h)anthracene	ND	ND	ND	ND	ND	80.
Indeno(1,2,3-cd)pyrene]* Benzo(ghi)perylene	ND	ND	ND	ND	ND	40.

*Co-Elute - cannot separate.

°All values in ng/g (ppb) dry weight basis.

ND - Nothing Detected.



CLIENT: Port of Seattle
REPORT TO: Mr. Doug Hotchkiss

DATE RECEIVED: 10/8/84
DATE REPORTED: 12/7/84
AGREEMENT # P-03611

HPLC ANALYSIS OF SEDIMENTS FOR POLYNUCLEAR AROMATICS

T - 32

Laboratory Sample No.	81291	81292	81293	81294	81295	Detection Limit
Client Identification	H 13-D	I 13-E	J 6-C	K 6-D	M 7-E	
<u>Parameters</u>						
Naphthalene	105.	ND	ND	ND	ND	50.
Acenaphthylene	160.	160.	ND	ND	ND	80.
Fluorene Acenaphthene]*	265.	210.	290.	215.	190.	80.
Phenanthrene	36.	14.	25.	28.	15.	10.
Anthracene	32.	17.	ND	ND	ND	10.
Fluoranthene	120.	ND	56.	39.	ND	25.
Pyrene	ND	ND	ND	ND	ND	30.
Benz(a)anthracene]* Chrysene	37.	ND	41.	ND	ND	15.
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	20.
Benzo(k)fluoranthene	75.	87.	65.	215.	ND	20.
Benzo(a)pyrene	ND	ND	41.	ND	ND	25.
Dibenz(a,h)anthracene	ND	ND	ND	ND	ND	80.
Indeno(1,2,3-cd)pyrene]* Benzo(ghi)perylene	ND	ND	ND	ND	ND	40.

*Co-Elute - cannot separate.

°All values in ng/g (ppb) dry weight basis.

ND - Nothing Detected.



CLIENT: Port of Seattle
REPORT TO: Mr. Doug Hotchkiss

DATE RECEIVED: 10/8/84
DATE REPORTED: 12/7/84
AGREEMENT # P-03611

HPLC ANALYSIS OF SEDIMENTS FOR POLYNUCLEAR AROMATICS

T-32

Laboratory Sample No.	81296	81297	81298	81299	81300	Detection Limit
Client Identification	M ¹	N	O	P	S	
	7-E	7-F	9-C	9-D	12-C	
<u>Parameters</u>						
Naphthalene	ND	ND	ND	ND	ND	50.
Acenaphthylene	540.	ND	ND	ND	ND	80.
Fluorene Acenaphthene]*	380.	200.	185.	ND	ND	80.
Phenanthrene	23.	14.	140.	ND	ND	10.
Anthracene	18.	ND	34.	ND	ND	10.
Fluoranthene	ND	ND	35.	ND	ND	25.
Pyrene	ND	ND	ND	ND	ND	30.
Benz(a)anthracene]* Chrysene	ND	ND	50.	ND	ND	15.
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	20.
Benzo(k)fluoranthene	54.	67.	ND	57.	ND	20.
Benzo(a)pyrene	ND	ND	ND	ND	ND	25.
Dibenz(a,h)anthracene	ND	ND	ND	ND	ND	80.
Indeno(1,2,3-cd)pyrene]* Benzo(ghi)perylene	ND	ND	ND	ND	ND	40.

*Co-Elute - cannot separate.

°All values in ng/g (ppb) dry weight basis.

ND - Nothing Detected.



CLIENT: Port of Seattle
REPORT TO: Doug Hotchkiss

DATE RECEIVED: 10/8/84
DATE REPORTED: 12/7/84

AGREEMENT # P-03611

HPLC ANALYSIS OF SEDIMENTS FOR POLYNUCLEAR AROMATICS

Laboratory Sample No.	T-32	P-28	Detection Limit
	81301	81302	
Client Identification	T & U Composite 12-D+E	W A-B	
<u>Parameters</u>			
Napthalene	ND	180.] 170.]	50.
Acenaphthylene	ND	ND] ND]	80.
Fluorene Acenaphthene]*	205.	ND] ND]	80.
Phenanthrene	ND	37.] 26.]	10.
Anthracene	ND	27.] 23.]	10.
Fluoranthene	ND	490.] 565.]	25.
Pyrene	ND	580.] 425.]	30.
Benz(a)anthracene]* Chrysene	ND	82.] 41.]	15.
Benzo(b)fluoranthene	ND	46.] 27.]	20.
Benzo(k)fluoranthene	ND	ND] ND]	20.
Benzo(a)pyrene	ND	35.] <25.]	25.
Dibenz(a,h)anthracene	ND	ND] ND]	80.
Ideno(1,2,3-cd)pyrene]* Benzo(ghi)perylene	ND	ND] ND]	40.

*Co-Elute - cannot separate.

°All values in ng/g (ppb) dry weight basis.

ND - Nothing detected.



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DATE REPORTED: 12/7/84

AGREEMENT # P-03611

GC/MS BASE NEUTRAL FRACTION ANALYSIS OF SEDIMENTS

Laboratory Sample No.

*

Client Identification

<u>Compounds</u>	<u>Detection Limits (ug/gram)</u>
Acenaphthene	5
Acenaphthylene	5
Anthracene	5
bis(2-chloroethoxy)methane	5
bis(2-chloroethyl)ether	10
bis(2-chloroisopropyl)ether	20
bis(2-ethylhexyl)phthalate	5
Benzidine	10
Benzo(a)anthracene	5
Benzo(a)pyrene	5
Benzo(b)fluoranthene	10
Benzo(ghi)perylene	20
Benzo(k)fluoranthene	5
Butyl Benzylphthalate	5
Chrysene	5
Di-n-butylphthalate	5
Di-n-octylphthalate	5
Dibenzo(ah)anthracene	20
Diethylphthalate	5
Dimethylphthalate	5
Fluoranthene	5
Fluorene	5

*All samples (81286 - 81302) are below stated detection limits

All results on a dry weight basis (ug/gram).



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REPORT TO: Doug Hotchkiss

DATE RECEIVED: 10/8/84
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AGREEMENT # P-03611

GC/MS BASE NEUTRAL FRACTION ANALYSIS OF SEDIMENTS

Laboratory Sample No.
Client Identification

*

<u>Compounds</u>	<u>Detection Limits (ug/gram)</u>
Hexachlorobenzene	5
Hexachlorobutadiene	10
Hexachlorocyclopentadiene	10
Hexachloroethane	15
Indeno(1,2,3-cd)pyrene	20
Isophorone	5
N-nitrosodi-n-propylamine	5
N-nitrosodimethylamine	20
N-nitrosodiphenylamine	5
Naphthalene	5
Nitrobenzene	10
Phenanthrene	5
Pyrene	5
1,2,4-Trichlorobenzene	5
1,2-Dichlorobenzene	5
1,2-Diphenylhydrazine	5
1,3-Dichlorobenzene	5
1,4-Dichlorobenzene	5
2,4-Dinitrotoluene	15
2,6-Dinitrotoluene	15
2-chloronaphthalene	5
3,3'-Dichlorobenzidine	5
4-Bromophenyl phenyl ether	15
4-chlorophenyl phenyl ether	5

*All samples (81286 - 81302) are below stated detection limits.
All results on a dry weight basis (ug/gram).



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AGREEMENT # P-03611

PRIORITY POLLUTANT SEDIMENT ANALYSIS - ACID FRACTION

Laboratory Sample Number

*

Parameter

Detection Limit
($\mu\text{g}/\text{gram}$)

2-Chlorophenol	0.1
2,4-Dichlorophenol	0.1
2,4-Dimethylphenol	0.1
4,6-Dinitro-o-cresol	0.2
2,4-Dinitrophenol	0.5
2-Nitrophenol	0.2
4-Nitrophenol	0.2
P-Chloro-m-cresol	0.1
Pentachlorophenol	0.2
Phenol	0.1
2,4,6-Trichlorophenol	0.1

* All samples (81286 - 81302) are below the above listed detection limits.

°Results on a dry weight basis.



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AGREEMENT # P-03611

PURGEABLE COMPOUND ANALYSIS

Laboratory Sample No. Client Identification	P-28				T-32				Detection Limit
	81286	81287	81288	81289	81290	81291	81292	81293	
	A & D	B	C	E	F & G	H	I	J	
	Composite B+C-A	B-B	B-C	B-D	Composite 10-D+E	13-D	13-E	G-C	
<u>Compounds</u>									
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	.1
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	.1
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND	.1
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	1.0
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	.1
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	.1
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	1.0
2-Chloroethylvinyl Ether	ND	ND	ND	ND	ND	ND	ND	ND	.5
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	.1
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	1.0
Dichlorobromomethane	ND	ND	ND	ND	ND	ND	ND	ND	.1
Dichlorodifluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	.5
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	.1
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	.1
1,1-Dichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	.1
Trans-1,2-Dichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	.1
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	.1
Cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	.1
Trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	.1
1,2-Dichloropropylene	ND	ND	ND	ND	ND	ND	ND	ND	.5
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	.1
Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	.1
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	.1
1,1,2,2-Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	.1
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	.1
1,1,1-Trichloroethane	ND	ND	ND	TRACE	ND	TRACE	TRACE	ND	.1
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	.1
Trichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	.1
Trichlorofluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	.1
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	1.0

*All values in (µg/gram) dry weight basis.



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AGREEMENT # P-03611

PURGEABLE COMPOUND ANALYSIS

Laboratory Sample No.	81294	81295	81296	81297	81298	81299	81300	81301	Detection
Client Identification	K	M	M ¹	N	O	P	S	T & U Composite	Limit
	6-D	7-E	7-E	7-F	9-C	9-D	12-C	12-D+E	
<u>Compounds</u>									
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	.1
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	.1
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND	.1
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	1.0
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	.1
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	.1
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	1.0
2-Chloroethylvinyl Ether	ND	ND	ND	ND	ND	ND	ND	ND	.5
Chloroform	ND	ND	ND	ND	ND	ND	ND	TRACE	.1
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	1.0
Dichlorobromomethane	ND	ND	ND	ND	ND	ND	ND	ND	.1
Dichlorodifluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	.5
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	.1
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	.1
1,1-Dichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	.1
Trans-1,2-Dichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	.1
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	.1
Cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	.1
Trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	.1
1,2-Dichloropropylene	ND	ND	ND	ND	ND	ND	ND	ND	.5
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	.1
Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	.1
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	.1
1,1,2,2-Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	.1
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	.1
1,1,1-Trichloroethane	TRACE	ND	ND	ND	TRACE	ND	ND	ND	.1
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	.1
Trichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	.1
Trichlorofluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	.1
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	1.0

*All values in (ug/gram) dry weight basis.



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DATE REPORTED: 12/7/84
AGREEMENT # P-03611

PURGEABLE COMPOUND ANALYSIS

Laboratory Sample No. 81302
Client Identification W
A-B

Detection
Limit

Compounds

Benzene	ND	.1
Bromodichloromethane	ND	.1
Bromoform	ND	.1
Bromomethane	ND	1.0
Carbon Tetrachloride	ND	.1
Chlorobenzene	ND	.1
Chloroethane	ND	1.0
2-Chloroethylvinyl Ether	ND	.5
Chloroform	ND	.1
Chloromethane	ND	1.0
Dichlorobromomethane	ND	.1
Dichlorodifluoromethane	ND	.5
1,1-Dichloroethane	ND	.1
1,2-Dichloroethane	ND	.1
1,1-Dichloroethylene	ND	.1
Trans-1,2-Dichloroethylene	ND	.1
1,2-Dichloropropane	ND	.1
Cis-1,3-Dichloropropene	ND	.1
Trans-1,3-Dichloropropene	ND	.1
1,2-Dichloropropylene	ND	.5
Ethylbenzene	ND	.1
Methylene Chloride	ND	.1
1,1,2,2-Tetrachloroethane	ND	.1
1,1,2,2-Tetrachloroethene	ND	.1
Toluene	ND	.1
1,1,1-Trichloroethane	ND	.1
1,1,2-Trichloroethane	ND	.1
Trichloroethylene	ND	.1
Trichlorofluoromethane	ND	.1
Vinyl Chloride	ND	1.0

*All values in (µg/gram) dry weight basis.



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DATE REPORTED: 12/7/84

			SEDIMENT GRAIN SIZE				AGREEMENT # P-03611	
			P-28				T-32	
Laboratory Sample Number			81286	81287	81288	81289	81290	81291
Client Identification			A & D Composite B+C-A	B B-B	C B-C	E B-D	F & G Composite 10-D+E	H 13-D
Grain Size			% RETENTION					
Tyler Screen	Mesh mm	Mesh Inch						
10	2.00	.0787	4.00	0.21	0.18	0.18	<0.09	3.86
20	0.85	.0331	2.31	0.17	0.11	<0.09	0.11	0.91
28	0.60	.0234	1.69	<0.08	<0.07	0.13	<0.09	1.47
60	0.25	.0098	24.0	4.20	1.72	0.57	2.79	34.8
150	0.11	.0041	23.6	27.0	14.6	9.45	32.7	35.2
200	0.08	.0029	5.08	13.3	12.9	11.6	12.4	5.33
PASS	<0.08	<.0029	39.2	55.1	70.4	77.9	51.8	18.5

Continued.



CLIENT: Port of Seattle

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SEDIMENT GRAIN SIZE

AGREEMENT# P-03611

Laboratory Sample Number

81292 81293 81294 81295 81296 81297

Client Identification

I 13-E J 6-C K 6-D M 7-E M¹ 7-E N 7-F

Grain Size

Tyler Mesh Mesh
Screen mm Inch

% RETENTION

10	2.00	.0787	3.67	0.39	0.12	0.35	0.27	0.16
20	0.85	.0331	1.08	0.42	0.25	0.12	0.35	0.12
28	0.60	.0234	0.68	0.85	0.69	1.45	0.98	0.24
60	0.25	.0098	32.3	37.6	44.5	30.5	33.0	24.1
150	0.11	.0041	39.1	40.2	40.6	45.0	45.4	45.6
200	0.08	.0029	4.83	4.24	3.55	6.56	5.97	6.57
PASS	<0.08	<.0029	18.4	16.3	10.3	16.0	14.0	23.2

Continued.



CLIENT: Port of Seattle

REPORT TO: Doug Hotchkiss

DATE RECEIVED: 10/8/84

DATE REPORTED: 12/7/84

SEDIMENT GRAIN SIZE

AGREEMENT # P-03611

			T-32				P-28
Laboratory Sample Number			81298	81299	81300	81301	81302
Client Identification			O 9-C	P 9-D	S 12-C	T & U Composite 12-D+E	W A-B
Grain Size							
Tyler Screen	Mesh mm	Mesh Inch	% RETENTION				
10	2.00	.0787	0.48	0.35	0.16	0.28	5.00
20	0.85	.0331	0.68	0.19	0.36	0.44	1.30
28	0.60	.0234	1.88	0.27	1.70	0.60	0.98
60	0.25	.0098	58.5	26.3	60.6	24.0	26.4
150	0.11	.0041	30.5	50.3	29.4	20.9	50.3
200	0.08	.0029	2.00	5.85	1.54	8.46	4.88
PASS	<0.08	<.0029	5.93	16.8	6.24	45.3	11.2

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LABORATORY NO. 85194

APPENDIX A

Surrogate Recovery Quality Control Report

Listed below are surrogate (chemically similar) compounds utilized in the analysis of organic compounds. The surrogates are added to every sample prior to analysis and extraction to monitor for matrix effects, purging efficiency and sample processing errors. The control limits represent the 95% confidence interval established in our laboratory through repetitive analysis of these sample types.

Priority Pollutant Analyses:

parts per million (mg/kg)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
7	2-Fluorophenol	33.05	33.36	91.9	26-116
7	2-Fluoroaniline	34.09	17.42	51.1	*
7	d5-Phenol	32.28	18.04	55.9	10-104
7	d5-Nitrobenzene	35.89	29.39	81.9	19-115
7	2-Fluorobiphenyl	32.28	33.99	105.3	17-125
7	2,4,6-Tribromophenol	32.28	29.79	92.3	32-124
15	2-Fluorophenol	38.47	27.35	71.1	26-116
15	2-Fluoroaniline	39.67	5.91	14.9	*
15	d5-Phenol	37.57	17.73	47.2	10-104
15	d5-Nitrobenzene	41.77	32.08	76.8	19-115
15	2-Fluorobiphenyl	37.57	30.24	80.5	17-125
15	2,4,6-Tribromophenol	37.57	27.20	72.4	32-124
16	2-Fluorophenol	31.47	34.49	109.6	26-116
16	2-Fluoroaniline	32.45	23.59	72.7	*
16	d5-Phenol	30.73	29.10	94.7	10-104
16	d5-Nitrobenzene	34.17	31.71	92.8	19-115
16	2-Fluorobiphenyl	30.73	34.26	111.5	17-125
16	2,4,6-Tribromophenol	30.73	35.40	115.2	32-124



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LABORATORY NO. 85194

parts per million (mg/kg)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
22	2-Fluorophenol	31.94	31.95	100.0	26-116
22	2-Fluoroaniline	32.94	21.56	65.5	*
22	d5-Phenol	31.19	26.66	85.5	10-104
22	d5-Nitrobenzene	34.68	33.86	97.7	19-115
22	2-Fluorobiphenyl	31.19	32.65	104.7	17-125
22	2,4,6-Tribromophenol	31.19	30.32	97.2	32-124
23	2-Fluorophenol	34.18	40.42	118.3	26-116
23	2-Fluoroaniline	35.25	20.07	56.9	*
23	d5-Phenol	33.38	33.42	100.1	10-104
23	d5-Nitrobenzene	37.12	38.01	102.4	19-115
23	2-Fluorobiphenyl	33.38	35.96	107.7	17-125
23	2,4,6-Tribromophenol	33.38	40.37	120.9	32-124
28	2-Fluorophenol	31.86	36.49	114.5	26-116
28	2-Fluoroaniline	32.86	21.16	64.4	*
28	d5-Phenol	31.11	27.83	89.5	10-104
28	d5-Nitrobenzene	34.60	34.23	98.9	19-115
28	2-Fluorobiphenyl	31.11	32.40	104.1	17-125
28	2,4,6-Tribromophenol	31.11	32.85	105.6	32-124
29	2-Fluorophenol	23.62	27.65	117.1	26-116
29	2-Fluoroaniline	24.35	7.86	32.3	*
29	d5-Phenol	23.06	16.88	73.2	10-104
29	d5-Nitrobenzene	25.65	21.17	82.5	19-115
29	2-Fluorobiphenyl	23.06	22.94	99.5	17-125
29	2,4,6-Tribromophenol	23.06	21.71	94.1	32-124
36	2-Fluorophenol	22.81	30.90	135.5	26-116
36	2-Fluoroaniline	23.52	18.66	79.3	*
36	d5-Phenol	22.27	19.75	88.7	10-104
36	d5-Nitrobenzene	24.77	26.26	106.0	19-115
36	2-Fluorobiphenyl	22.27	22.80	102.4	17-125
36	2,4,6-Tribromophenol	22.27	18.08	81.4	32-124



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parts per million (mg/kg)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
42	2-Fluorophenol	25.90	25.28	97.6	26-116
42	2-Fluoroaniline	26.71	14.96	56.0	*
42	d5-Phenol	24.29	17.23	68.1	10-104
42	d5-Nitrobenzene	28.12	31.91	113.5	19-115
42	2-Fluorobiphenyl	25.29	28.66	113.3	17-125
42	2,4,6-Tribromophenol	25.29	25.59	101.2	32-124
36 Spike	2-Fluorophenol	22.81	26.95	118.1	26-116
36 Spike	2-Fluoroaniline	23.52	12.48	53.1	*
36 Spike	d5-Phenol	22.27	19.66	88.3	10-104
36 Spike	d5-Nitrobenzene	24.77	23.68	95.6	19-115
36 Spike	2-Fluorobiphenyl	22.27	21.79	97.9	17-125
36 Spike	2,4,6-Tribromophenol	22.27	18.41	82.7	32-124
36 Dup.	2-Fluorophenol	22.81	25.82	113.2	26-116
36 Dup.	2-Fluoroaniline	23.52	11.73	49.9	*
36 Dup.	d5-Phenol	22.27	20.84	93.6	10-104
36 Dup.	d5-Nitrobenzene	24.77	25.63	103.5	19-115
36 Dup.	2-Fluorobiphenyl	22.27	24.41	96.1	17-125
36 Dup.	2,4,6-Tribromophenol	22.27	19.54	87.7	32-124
Blank	2-Fluorophenol	17.07	20.71	121.3	26-116
Blank	2-Fluoroaniline	26.71	30.27	113.3	*
Blank	d5-Phenol	16.67	15.56	93.3	10-104
Blank	d5-Nitrobenzene	18.53	19.69	106.3	19-115
Blank	2-Fluorobiphenyl	16.67	17.76	106.5	17-125
Blank	2,4,6-Tribromophenol	16.67	16.78	100.7	32-124



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parts per billion (ug/kg)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
7	Dibutylchlorendate	333.	380.	114.	41-121
15	Dibutylchlorendate	333.	686.	206.	41-121
16	Dibutylchlorendate	333.	446.	134.	41-121
22	Dibutylchlorendate	333.	583.	175.	41-121
23	Dibutylchlorendate	333.	406.	122.	41-121
28	Dibutylchlorendate	333.	390.	117.	41-121
29	Dibutylchlorendate	333.	500.	150.	41-121
36	Dibutylchlorendate	333.	669.	201.	41-121
42	Dibutylchlorendate	333.	460.	138.	41-121
Blank	Dibutylchlorendate	333.	483.	145.	41-121
36 Spike I	Dibutylchlorendate	333.	292.	87.8	41-121
36 Spike II	Dibutylchlorendate	333.	380.	114.	41-121

E.P. Toxicity Analyses:

parts per million (mg/L)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
7	Isodrin	0.00200	0.00172	86.0	43-118
15	Isodrin	0.00200	0.00145	72.8	43-118
16	Isodrin	0.00200	0.00146	73.0	43-118
22	Isodrin	0.00200	0.00189	94.3	43-118
23	Isodrin	0.00200	0.00185	92.3	43-118
28	Isodrin	0.00200	0.00193	96.6	43-118
29	Isodrin	0.00200	0.00210	105.	43-118
36	Isodrin	0.00200	0.00209	104.	43-118
42	Isodrin	0.00200	0.00183	91.7	43-118
Blank	Isodrin	0.00200	0.00104	52.0	43-118
Spike I	Isodrin	0.00200	0.00177	88.4	43-118
Spike II	Isodrin	0.00200	0.00205	102.	43-118



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parts per million (mg/L)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
7	2,4,5-T	0.0400	.0241	60.3	*
15	2,4,5-T	0.0400	.0145	36.3	*
16	2,4,5-T	0.0400	.0203	50.8	*
22	2,4,5-T	0.0400	.0143	35.5	*
23	2,4,5-T	0.0400	.0163	40.7	*
28	2,4,5-T	0.0400	.0215	53.7	*
29	2,4,5-T	0.0400	.0146	36.6	*
36	2,4,5-T	0.0400	.0184	45.9	*
42	2,4,5-T	0.0400	.0232	58.0	*
Blank	2,4,5-T	0.0400	.0292	73.0	*
29 Spike I	2,4,5-T	0.0400	.0428	107.	*
29 Spike II	2,4,5-T	0.0400	.0354	88.5	*

APPENDIX B

Replicate Quality Control Report

<u>Sample #</u>	<u>Analyte</u>	<u>Replicate 1</u>	<u>Replicate 2</u>	<u>Relative Error, %</u>
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PRIORITY POLLUTANT ANALYSES

		<u>%</u>	
42	Total Solids	68.2	66.9
42	Volatile Solids	6.2	5.1
			1.9
			18.



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parts per million (mg/kg)

<u>Sample #</u>	<u>Analyte</u>	<u>Replicate 1</u>	<u>Replicate 2</u>	<u>Relative Error, %</u>
42	Antimony	L/0.5	L/0.5	0.
42	Arsenic	15.	10.	33.
42	Beryllium	0.14	0.16	12.
42	Cadmium	1.5	1.6	6.2
42	Chromium	30.	31.	3.2
42	Copper	47.	44.	6.4
42	Lead	62.	50.	19.
42	Mercury	0.66	0.68	2.9
42	Nickel	30.	27.	10.
42	Selenium	L/0.5	L/0.5	0.
42	Silver	0.5	0.6	(0.1)
42	Thallium	L/0.5	L/0.5	0.
42	Zinc	150.	140.	6.7
7 Spike	Phenol	0.8	0.7	12.
22	Cyanide	L/0.5	L/0.5	0.
42	Cyanide	L/0.5	L/0.5	0.

BULK SAMPLE ANALYSES

<u>%</u>				
22	Sand	28.8	20.0	30.
22	Silt	52.8	59.6	11.
22	Clay	18.4	20.4	10.
22	Total Organic Carbon	2.2	2.2	0.
42	Oil & Grease	0.21	0.28	25.
42	Sulfide	0.005	0.006	(.001)



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		<u>parts per million (mg/L)</u>		
<u>Sample #</u>	<u>Analyte</u>	<u>Replicate 1</u>	<u>Replicate 2</u>	<u>Relative Error, %</u>
E.P. TOXICITY ANALYSES				
36	Cadmium	L/0.02	L/0.02	0.
36	Chromium	L/0.1	L/0.1	0.
36	Lead	L/0.2	L/0.2	0.
36	Silver	L/0.1	L/0.1	0.
36	Barium	L/0.5	L/0.5	0.
36	Mercury	L/0.005	L/0.005	0.
36	Arsenic	L/0.005	L/0.005	0.
36	Selenium	L/0.005	L/0.005	0.

APPENDIX C

Spike Quality Control Report

<u>Sample #</u>	<u>Analyte</u>	<u>mg/L</u>		<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
		<u>Sample Found</u>	<u>Spike Level</u>			
PRIORITY POLLUTANT ANALYSES						
42	Antimony	L/0.5	2.5	1.8	72.	*
42	Arsenic	10.	25.	35.	100.	*
42	Beryllium	0.14	0.25	0.27	52.	*
42	Cadmium	1.5	0.5	1.9	80.	*
42	Chromium	30.	100.	130.	100.	*
42	Copper	47.	100.	150.	103.	*
42	Lead	62.	50.	100.	80.	*



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Sample #	Analyte	mg/L			% Recovery	Control Limit
		Sample Found	Spike Level	Spike Found		
42	Mercury	0.66	0.25	0.91	100.	*
**	Nickel	19.	10.	29.	100.	*
42	Selenium	0.4	2.5	3.1	104.	*
42	Silver	0.5	1.0	1.6	110.	*
42	Thallium	L/0.5	2.5	1.9	76.	*
42	Zinc	150.	100.	240.	90.	*
7	Phenol	L/0.1	0.8	0.7	88.	*
7	Phenol	L/0.1	0.8	0.8	100.	*
36	Cyanide	L/0.5	3.3	3.9	118.	*

ug/L						
36 Spk. I	g.BHC	L/5.	333.	350.	105.	87-107
36 Spk. I	Heptachlor	L/5.	333.	376.	113.	43-125
36 Spk. I	Aldrin	L/5.	333.	380.	114.	43-109
36 Spk. I	Dieldrin	L/5.	333.	376.	113.	56-122
36 Spk. I	Endrin	L/10.	333.	360.	110.	89-101
36 Spk. I	DDT	L/10.	333.	380.	114.	82-102
36 Spk. II	g.BHC	L/5.	333.	523.	157.	87-107
36 Spk. II	Heptachlor	L/5.	333.	529.	159.	43-125
36 Spk. II	Aldrin	L/5.	333.	519.	156.	43-109
36 Spk. II	Dieldrin	L/5.	333.	513.	154.	56-122
36 Spk. II	Endrin	L/5.	333.	523.	157.	89-101
36 Spk. II	DDT	L/5.	333.	423.	127.	82-102

E.P. TOXICITY ANALYSES

parts per million (mg/L)						
36	Cadmium	L/0.02	1.0	0.98	98.	*
36	Chromium	L/0.1	1.0	1.0	100.	*
36	Lead	L/0.2	5.0	5.0	100.	*



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Sample #	Analyte	mg/L		Spike Found	% Recovery	Control Limit
		Sample Found	Spike Level			
36	Silver	L/0.1	1.0	0.9	90.	*
36	Barium	L/0.5	10.0	11.1	110.	*
36	Mercury	L/0.005	0.010	0.011	110.	*
36	Arsenic	L/0.005	0.25	0.22	88.	*
36	Selenium	L/0.005	0.25	0.28	112.	*
42 Spk. I	Endrin	L/0.0002	0.004	0.00106	46.4	89-101
42 Spk. II	Endrin	L/0.0002	0.004	0.00162	40.4	89-101
29 Spk. I	2,4-D	L/0.005	0.016	0.0110	68.8	*
29 Spk. I	2,4,5-TP	L/0.005	L/0.016	L/0.0110	68.8	*
29 Spk. II	2,4-D	L/0.005	0.0160	0.0123	76.6	*
29 Spk. II	2,4,5-TP	L/0.002	0.0080	0.00623	77.9	*

BULK SAMPLE ANALYSES

42	Oil & Grease	0.21	1.22	1.38	96.	*
----	--------------	------	------	------	-----	---

* No control limits yet established.

** POS sample was spiked too low for observable recovery. Another sample which was run concurrently was spiked appropriately and the results reported here.

() = absolute

The control limits are a statistically derived measure of the level of confidence in the measurement. These control limits determine the range within which the analytical value will fall 95% of the time.



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APPENDIX D

Base Acid Neutral Spike Recoveries

Sample 36 was spiked twice with two different aliquots (22.45 gm) with 1000 u1 of 157-3 @ 200 ug/ml. (8.9 ug/gm).

<u>Compounds</u>	<u>MS % Recovery</u>	<u>DS % Recovery</u>	<u>% Deviation</u>
1,2,4-Trichlorobenzene	98.5	101.5	-2.9
Acenaphthene	103.1	98.9	4.1
2,4-Dinitrotoluene	75.6	69.1	9.0
Di-n-butylphthalate	109.8	91.2	18.4
Pyrene	101.1	89.7	11.9
N-nitroso-di-N-propylamine	110.3	113.6	-3.2
1,4-Dichlorobenzene	86.8	89.6	-3.2
Pentachlorophenol	26.5	42.9	-47.2
Phenol	99.3	100.8	-1.5
2-Chlorophenol	100.4	102.0	-1.6
p-Chloro-m-cresol	69.3	68.1	1.7
4-NITROPHENOL	90.1	90.4	-0.3



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APPENDIX E

Comments on Limits of Detection

The laboratory makes every effort to meet the lower limits of detection (LLDs) requested. In some cases, LLDs are elevated due to interferences.

The primary cause of elevated LLDs is sample matrix. Detector response to sample matrix may be determined to be interference, rather than, in this case, pesticides through analytical interpretation. This interpretation will take into account lack of confirmation by a second chromatogram, poor peak shape, interference from a multiple component chemical (i.e., PCBs), etc.

The final result of the interference is that the pesticide cannot be "seen" down to the level which would be achievable without that interference.

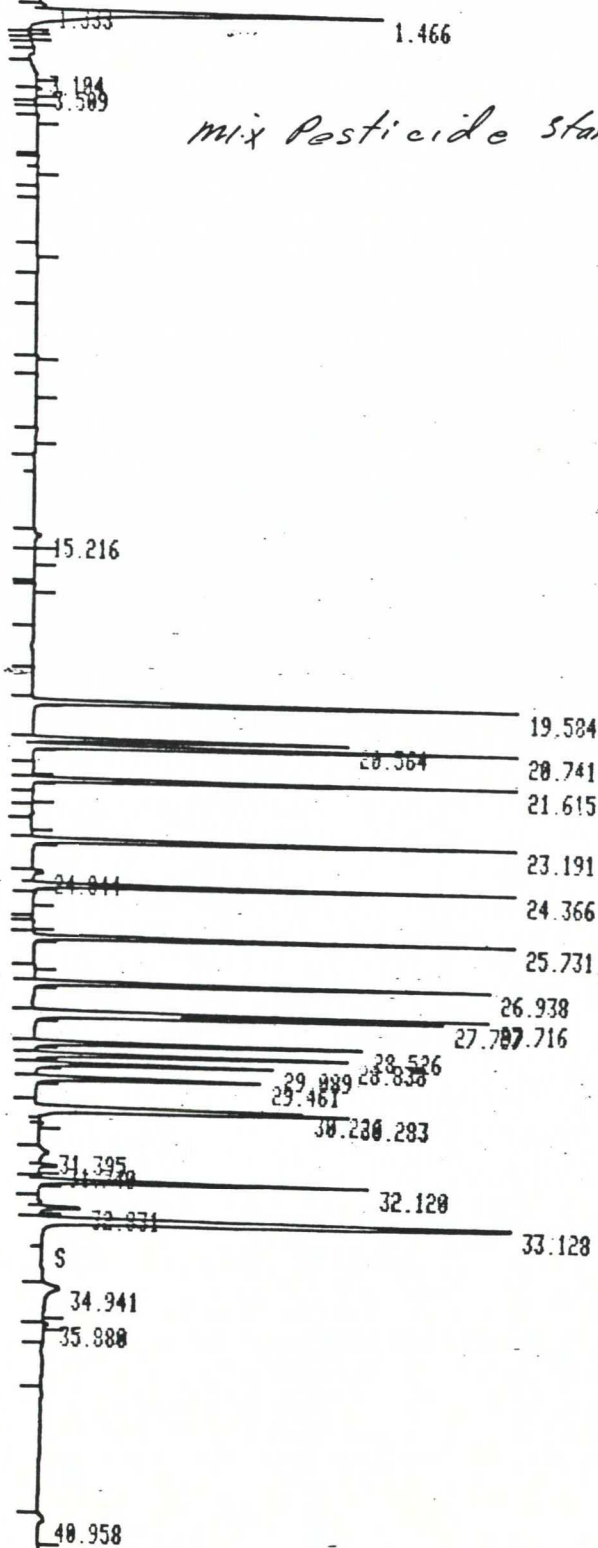
Attached are copies of chromatograms for both a mixed pesticide standard and a PCB Arochlor 1260 standard. From reviewing both chromatograms, it can be seen that presence of PCBs in the sample would make it impossible to "read" the presence of pesticides below the level reported to you.



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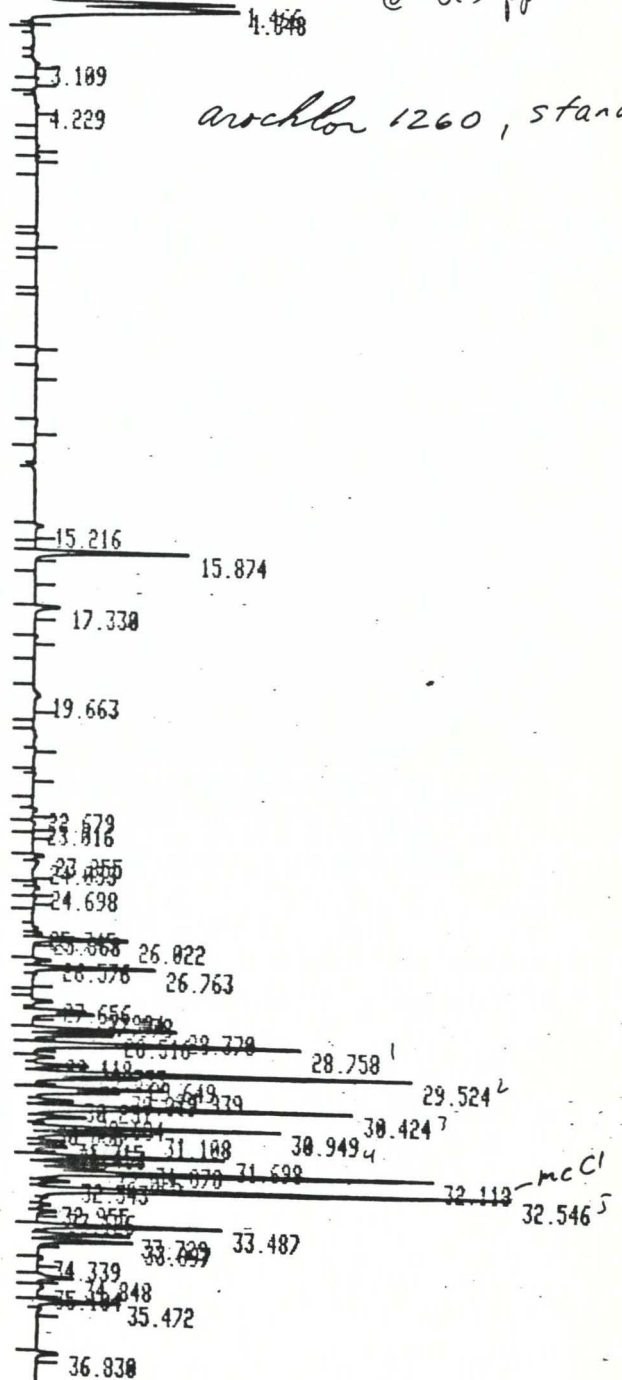
Std 145-5

START



START

Std 1260
@ 0.5 ppm



V. SECOND SERIES (QA/QC)

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APPENDIX A

Replicate Quality Control Report

Inorganics

<u>Sample</u>	<u>Analyte</u>	<u>Replicate 1</u>	<u>Replicate 2</u>	<u>Relative Error</u>
		<u>%</u>		
A	Total Solids	77.8	77.6	0.2
		<u>%, dry basis</u>		
A	Volatile Solids	1.3	1.3	0.
8	Total Organic			
	Carbon	4.1	3.8	7.3
9	Oil & Grease	0.98	0.81	17.
8	Sulfide as S	0.33	0.19	42.
8	Sand	10.8	9.4	13.
8	Silt	70.4	67.7	3.8
8	Clay	18.8	22.9	18.



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<u>Sample</u>	<u>Analyte</u>	<u>Replicate 1</u>	<u>Replicate 2</u>	<u>Relative Error</u>
		<u>parts per million (mg/kg), dry basis</u>		
C	Cyanide	L/0.10	L/0.10	0.
D	Mercury	0.2	0.2	0.
9	Nickel	92.	88.	4.3
9	Zinc	970.	1000.	3.0
9	Chromium	92.	92.	0.
9	Arsenic	15.	15.	0.
9	Copper	150.	160.	6.2
9	Lead	190.	220.	14.
9	Cadmium	4.8	5.4	11.
9	Thallium	L/1.	L/1.	(0.)
9	Selenium	0.5	0.5	(0.)
A	Phenol	L/0.15	L/0.15	0.
9	Beryllium	0.50	0.44	12.
9	Antimony	L/1.	L/1.	(0.)
9	Silver	1.9	1.0	47.

() indicates absolute error
L/ indicates "less than"



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APPENDIX B

Spike Quality Control Report

Inorganics

<u>Sample</u>	<u>Analyte</u>	<u>Sample Found</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>
		<u>%, dry basis</u>			
A	Oil & Grease	0.07	1.24	1.32	101.
		<u>parts per million (mg/kg), dry basis</u>			
C	Mercury	0.2	0.3	0.5	100.
C	Cyanide	L/0.10	0.98	0.31	32.
9	Cyanide	0.24	1.5	1.4	77.
9	Nickel	92.	100.	192.	100.
9	Zinc	970.	250.	1230.	104.
9	Chromium	92.	100.	196.	104.
9	Arsenic	15.	20.	33.	90.
9	Copper	150.	200.	350.	100.
9	Lead	190.	110.	310.	109.
9	Cadmium	4.8	11.	15.2	94.
B	Thallium	L/1.	2.5	5.4	216.
9	Selenium	0.5	2.0	2.3	90.
5	Phenol	L/0.15	0.85	0.78	92.
9	Beryllium	0.50	0.50	1.00	100.
9	Antimony	L/1.	10.	3.6	36.
9	Silver	1.9	0.96	2.7	83.

L/ indicates "less than"



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APPENDIX C

Surrogate Recovery Quality Control Report

Listed below are surrogate (chemically similar) compounds utilized in the analysis of volatile and organic compounds. The surrogates are added to every sample prior to extraction and analysis to monitor for matrix effects, purging efficiency, and sample processing errors. The control limits represent the 95% confidence interval established in our laboratory through repetitive analysis of these sample types. In certain cases, we will have accumulated insufficient data to have established control limits.

Sample #	Surrogate Compound	Spike Level	Spike Found	% Recovery	Control Limits
parts per million (mg/kg)					
A	d4-1,2-Dichloroethane	0.735	0.761	103.6	50-160
A	d8-Toluene	0.735	0.696	94.7	50-160
A	Bromofluorobenzene	0.735	0.821	111.7	50-160
B	d4-1,2-Dichloroethane	0.698	0.553	79.2	50-160
B	d8-Toluene	0.698	0.685	98.2	50-160
B	Bromofluorobenzene	0.698	0.808	115.8	50-160
C	d4-1,2-Dichloroethane	0.676	0.633	93.6	50-160
C	d8-Toluene	0.676	0.677	100.1	50-160
C	Bromofluorobenzene	0.676	0.779	115.2	50-160
Blank	d4-1,2-Dichloroethane	0.050	0.0496	99.3	50-160
Blank	d8-Toluene	0.050	0.0501	100.1	50-160
Blank	Bromofluorobenzene	0.050	0.0550	109.9	50-160
Spike	d4-1,2-Dichloroethane	0.370	0.382	103.3	50-160
Spike	d8-Toluene	0.370	0.355	95.9	50-160
Spike	Bromofluorobenzene	0.370	0.391	105.8	50-160
Dupe	d4-1,2-Dichloroethane	0.368	0.370	100.6	50-160
Dupe	d8-Toluene	0.368	0.345	93.8	50-160
Dupe	Bromofluorobenzene	0.368	0.396	107.5	50-160



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<u>Sample #</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limits</u>
<u>parts per million (mg/kg)</u>					
5	d4-1,2-Dichloroethane	0.372	0.360	96.7	50-160
5	d8-Toluene	0.372	0.368	98.9	50-160
5	Bromofluorobenzene	0.372	0.409	110.0	50-160
8	d4-1,2-Dichloroethane	0.865	0.870	100.6	50-160
8	d8-Toluene	0.865	0.886	102.4	50-160
8	Bromofluorobenzene	0.865	0.976	112.8	50-160
9	d4-1,2-Dichloroethane	0.700	0.734	104.8	50-160
9	d8-Toluene	0.700	0.648	92.6	50-160
9	Bromofluorobenzene	0.700	0.768	109.7	50-160
<u>parts per billion (ug/kg)</u>					
A	2-Fluorophenol	4096.	3328.	81.2	24-133
A	2-Fluoroaniline	4224.	1042.	24.7	---
A	d5-Phenol	4000.	2645.	66.1	20-122
A	2-Bromophenol	4000.	2552.	63.8	---
A	d5-Nitrobenzene	4224.	2915.	69.0	20-140
A	2-Fluorobiphenyl	4000.	3188.	79.7	20-140
A	2,4,6-Tribromophenol	4000.	1496.	37.4	10-114
A	d14-p-Terphenyl	4000.	2920.	73.0	20-150
B	2-Fluorophenol	4096.	3002.	73.3	24-133
B	2-Fluoroaniline	4224.	1049.	24.8	---
B	d5-Phenol	4000.	2456.	61.4	20-122
B	2-Bromophenol	4000.	2616.	65.4	---
B	d5-Nitrobenzene	4224.	2581.	61.1	20-140
B	2-Fluorobiphenyl	4000.	3292.	82.3	20-140
B	2,4,6-Tribromophenol	4000.	2512.	62.8	10-114
B	d14-p-Terphenyl	4000.	3468.	86.7	20-150



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<u>Sample #</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limits</u>
<u>parts per billion (ug/kg)</u>					
C	2-Fluorophenol	4096.	1896.	46.3	24-133
C	2-Fluoroaniline	4224.	966.	22.8	---
C	d5-Phenol	4000.	1547.	38.7	20-122
C	2-Bromophenol	4000.	1648.	41.2	---
C	d5-Nitrobenzene	4224.	1748.	41.4	20-140
C	2-Fluorobiphenyl	4000.	2376.	59.4	20-140
C	2,4,6-Tribromophenol	4000.	1996.	49.9	10-114
C	d14-p-Terphenyl	4000.	1728.	43.2	20-150
5	2-Fluorophenol	4096.	3274.	79.9	24-133
5	2-Fluoroaniline	4224.	2141.	50.7	---
5	d5-Phenol	4000.	2748.	68.7	20-122
5	2-Bromophenol	4000.	2700.	67.5	---
5	d5-Nitrobenzene	4224.	3070.	72.7	20-140
5	2-Fluorobiphenyl	4000.	3416.	85.4	20-140
5	2,4,6-Tribromophenol	4000.	2720.	68.0	10-114
5	d14-p-Terphenyl	4000.	2864.	71.6	20-150
8	2-Fluorophenol	4096.	2776.	67.8	24-133
8	2-Fluoroaniline	4224.	1510.	35.7	---
8	d5-Phenol	4000.	2296.	57.4	20-122
8	2-Bromophenol	4000.	2708.	67.7	---
8	d5-Nitrobenzene	4224.	2537.	60.1	20-140
8	2-Fluorobiphenyl	4000.	3036.	75.9	20-140
8	2,4,6-Tribromophenol	4000.	2856.	71.4	10-114
8	d14-p-Terphenyl	4000.	2600.	65.0	20-150
9	2-Fluorophenol	4096.	3338.	81.5	24-133
9	2-Fluoroaniline	4224.	1624.	38.5	---
9	d5-Phenol	4000.	2536.	63.4	20-122
9	2-Bromophenol	4000.	2664.	66.6	---
9	d5-Nitrobenzene	4224.	2959.	70.1	20-140
9	2-Fluorobiphenyl	4000.	3624.	90.6	20-140
9	2,4,6-Tribromophenol	4000.	3032.	75.8	10-114
9	d14-p-Terphenyl	4000.	3812.	95.3	20-150



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<u>Sample #</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limits</u>
<u>parts per billion (ug/kg)</u>					
Spike	2-Fluorophenol	4096.	3242.	79.2	24-133
Spike	2-Fluoroaniline	4224.	1710.	40.5	---
Spike	d5-Phenol	4000.	3156.	78.9	20-122
Spike	2-Bromophenol	4000.	2776.	69.4	---
Spike	d5-Nitrobenzene	4224.	3105.	73.5	20-140
Spike	2-Fluorobiphenyl	4000.	3208.	80.2	20-140
Spike	2,4,6-Tribromophenol	4000.	2752.	68.8	10-114
Spike	d14-p-Terphenyl	4000.	2824.	70.6	20-150
Dupe	2-Fluorophenol	4096.	3475.	84.8	24-133
Dupe	2-Fluoroaniline	4224.	1682.	39.8	---
Dupe	d5-Phenol	4000.	3173.	79.3	20-122
Dupe	2-Bromophenol	4000.	2812.	70.3	---
Dupe	d5-Nitrobenzene	4224.	3252.	77.0	20-140
Dupe	2-Fluorobiphenyl	4000.	3383.	84.6	20-140
Dupe	2,4,6-Tribromophenol	4000.	2945.	73.6	10-114
Dupe	d14-p-Terphenyl	4000.	2952.	73.8	20-150
Blank	2-Fluorophenol	4096.	2858.	69.8	24-133
Blank	2-Fluoroaniline	4224.	2601.	61.6	---
Blank	d5-Phenol	4000.	2440.	61.0	20-122
Blank	2-Bromophenol	4000.	2229.	55.7	---
Blank	d5-Nitrobenzene	4224.	2628.	62.2	20-140
Blank	2-Fluorobiphenyl	4000.	2892.	72.3	20-140
Blank	2,4,6-Tribromophenol	4000.	2211.	55.3	10-114
Blank	d14-p-Terphenyl	4000.	2825.	70.6	20-150
A	Dibutylchlorendate	20.0	10.5	52.7	20-150
B	Dibutylchlorendate	20.0	4.94	24.7	20-150
C	Dibutylchlorendate	20.0	17.2	86.1	20-150
5	Dibutylchlorendate	20.0	17.0	84.9	20-150
8	Dibutylchlorendate	20.0	4.46	22.3	20-150
9	Dibutylchlorendate	20.0	10.9	54.3	20-150
Blank	Dibutylchlorendate	20.0	26.8	134.	20-150
5 MS	Dibutylchlorendate	20.0	15.5	77.7	20-150
5 MSD	Dibutylchlorendate	20.0	16.9	84.7	20-150



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APPENDIX D

Matrix Spike/Duplicate Spike

Quality Control Report

Organics

Reported below are the results of additional QC compounds utilized in the analysis of organic compounds. Compounds of interest are spiked into two additional sample aliquots prior to extraction and/or analysis to monitor for matrix effects, sample processing errors, and to calculate percent recoveries of compounds of interest and relative error in the analysis. The control limits represent the 95% confidence interval established in the laboratory through repetitive analysis of samples.

Compound	Conc Spike	Conc Samp	Conc MS	% REC	Conc MSD	% REC	RPD	RPD Limit	REC Limit
1,1-Dichloroethene	125.	0.	169.	135.	178.	142.	-4.9	22.	59-172
Trichloroethene	125.	0.	142.	114.	155.	124.	-8.4	24.	62-137
Chlorobenzene	125.	0.	133.	106.	144.	115.	-7.6	21.	60-133
Toluene	125.	0.	142.	114.	148.	118.	-3.8	21.	59-139
Benzene	125.	0.	127.	102.	136.	109.	-6.8	21.	66-142
1,2,4-Trichlorobenzene	50.	0.	37.1	74.2	38.1	76.2	-2.6	23.	38-107
Acenaphthene	50.	0.	44.4	88.8	44.5	89.0	-0.2	19.	31-137
2,4-Dinitrotoluene	50.	0.	34.0	68.0	33.8	67.6	0.6	47.	28-89
Di-n-Butylphthalate	50.	0.	42.0	84.0	44.2	88.4	-5.1	47.	29-135
Pyrene	10.	0.	8.91	89.1	8.41	84.1	5.7	36.	35-142
N-Nitrosodipropylamine	50.	0.	45.5	91.0	45.3	90.6	0.5	38.	41-126
1,4-Dichlorobenzene	50.	0.	37.4	74.8	36.6	73.2	2.1	27.	28-104
Pentachlorophenol	100.	0.	44.3	44.3	46.2	46.2	-4.2	47.	17-109
Phenol	100.	0.	72.4	72.4	71.5	71.5	1.3	35	26-90
2-Chlorophenol	100.	0.	70.7	70.7	70.5	70.5	0.3	50	25-102
P-Chloro-m-cresol	100.	0.	65.2	65.2	61.2	61.2	6.3	33.	26-103
4-Nitrophenol	100.	0.	46.2	46.2	40.6	40.6	12.9	50.	11-114



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Concentrations in the spike, matrix spike and matrix spike duplicate are shown in parts per billion (ug/kg).

Conc = Concentration

Samp = Sample

MS = Matrix Spike

MSD = Matrix Spike Duplicate

REC = Recovery

RPD = Relative Percent Difference



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APPENDIX E

Spike Quality Control Report

Organics Pesticide Fraction

<u>Sample</u>	<u>Analyte</u>	<u>Sample Found</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
<u>parts per billion (ug/kg)</u>						
5 MS	Lindane	L/1.	8.0	2.66	33.3	46-127*
5 MS	Heptachlor	L/1.	8.0	2.08	26.0	35-130*
5 MS	Aldrin	L/1.	8.0	4.72	58.9	34-132
5 MS	Dieldrin	L/1.	20.4	7.4	36.6	31-134
5 MS	Endrin	L/1.	20.	7.24	36.2	42-139*
5 MS	4,4'-DDT	L/1.	20.0	14.3	71.3	23-134
5 MSD	Lindane	L/1.	8.0	2.12	26.5	46-127*
5 MSD	Heptachlor	L/1.	8.0	1.66	20.7	35-130*
5 MSD	Aldrin	L/1.	8.0	8.87	111.	34-132
5 MSD	Dieldrin	L/1.	20.4	8.61	42.2	31-134
5 MSD	Endrin	L/1.	20.0	8.99	45.0	42-139
5 MSD	4,4'-DDT	L/1.	20.0	16.8	83.9	46-127

* Lower than normal recoveries may sometimes be attributable to sample matrix effects. Specifically, sulfur may cause suppression of the compound signals. Sulfur was recognized as present in the sample residue matrix, and clean-up steps were taken to alleviate the problem.



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CLIENT Port of Seattle
P.O. Box 1209
Seattle, WA 98111
ATTN: Doug Hotchkiss

LABORATORY NO. 89964

DATE June 28, 1985

PO #P-03849

REPORT ON SEDIMENT & WATER

SAMPLE IDENTIFICATION

TESTS PERFORMED AND RESULTS:

- 1) Aliquot portions from two jars of archived sample, previously identified by laboratory number 85194-18 (HC-7-S1) were composited to create one sample.
- 2) Aliquot portions from four jars of archived sample, previously identified by laboratory numbers 85194-4 (HC-11-S1); 85194-27 (HC-10-S1); 85194-31 (HC-9-S1) and 85194-32 (HC-9-S2) were composited to create one sample, with each station equally weighted.
- 3) Aliquot portions from four jars of archived sample, previously identified by laboratory numbers 85194-9 (HC-13-S1: 2 jars) and 85194-39 (HC-14-S1: 2 jars) were composited to create one sample, with each station equally weighted.

*T-39
Disposed
in T-91
5 Foot Fill*

The following were sampled by us on May 30, 1985 at Piers 90 & 91, from locations A-D shown on the enclosed map.

Spoil samples consisted of composites from 6-8 penetrations per site. Each penetration recovered 10"-12" of sediment.

Water samples were taken at an average depth of 7 meters below mllw.

SEDIMENT:

- 4) A
- 5) B
- 6) B duplicate
- 7) C
- 8) D

WATER:

- 9) A
- 10) B
- 11) B duplicate
- 12) C
- 13) D

*Pne Short
Fill Const.
existing
background
samples*



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SEDIMENT ANALYSES

Grain Size Analysis

	<u>% , dry basis</u>			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Sand	9.8	21.5	19.7	28.2
Silt	67.3	59.4	59.7	62.8
Clay	22.9	19.1	20.6	9.0
	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
Sand	30.3	31.1	63.5	67.8
Silt	53.5	53.7	30.8	24.4
Clay	16.2	15.2	5.7	7.8

Spoils Analysis

Samples were passed through a No. 10 sieve prior to analysis. Only material passing the sieve was analyzed. Percentages retained were as follow:

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
% Retained	4.	2.	3.	3.
major description	wood	rocks	shell	shell
minor description	shell	wood	rocks	rocks
	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
% Retained	4.	3.	2.	6.
major description	rocks	rocks	wood	rocks
minor description	wood	wood	shell	shell



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	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
	<u>%, as received basis</u>			
Total Solids	48.3	53.5	56.3	64.2
	<u>%, dry basis</u>			
Total Organic Carbon	7.1	7.0	4.8	1.8
Total Volatile Solids	10.5	6.5	6.4	2.9
Oil & Grease	1.8	0.67	0.58	0.19
Sulfide as S	0.13	0.097	0.025	0.082

	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
	<u>%, as received basis</u>			
Total Solids	48.9	49.1	61.0	70.7
	<u>%, dry basis</u>			
Total Organic Carbon	4.4	4.1	2.4	1.8
Total Volatile Solids	7.2	6.8	3.8	2.7
Oil & Grease	0.99	0.91	0.45	0.16
Sulfide as S	0.096	0.070	0.17	0.010

Halogenated Hydrocarbons

Samples were then analyzed for Halogenated Hydrocarbons in accordance with Washington State Department of Ecology WAC 173-303 with results as follow:

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Halogenated Hydrocarbons# parts per million (mg/kg), as received basis	L/15.	L/15.	L/15.	L/15.



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	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
Halogenated Hydrocarbons# parts per million (mg/kg), as received basis	L/15.	L/15.	L/15.	L/15.

reported as the sum of the halogens bromide, chloride, fluoride and iodide.
A value of less than 100 mg/kg is classified as undesignated waste.

Gravimetric Polycyclic Aromatic Hydrocarbons

Samples were analyzed also for Gravimetric Polycyclic Aromatic Hydrocarbons in accordance with Washington State Department of Ecology WAC 173-303. The method requires analysis of the sample through successive stages until the result obtained is less than 1% by weight (as received basis) or until the fourth stage has been completed. Results are as shown below:

<u>Stage:</u>	<u>% by weight, as received basis##</u>			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
1. Soxhlet Extraction	0.075	0.049	0.059	0.11
	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
1. Soxhlet Extraction	0.087	0.22	0.044	0.099

for 4,5,6 membered rings



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E.P. Toxicity

Samples were analyzed for E.P. Toxicity in accordance with Test Methods for Evaluating Solid Wastes, U.S.E.P.A., July, 1982. The extractions were performed under Method 1310; metals analyses were performed using the 7000 series of methods, and the pesticides and herbicides were performed using methods 8080 and 8150.

concentration, mg/L (parts per million)

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>MCL</u>
Arsenic	L/0.2	L/0.2	L/0.2	L/0.2	5.0
Barium	0.3	0.3	0.3	0.3	100.
Cadmium	0.03	0.01	0.02	L/0.01	1.0
Chromium	L/0.1	L/0.1	L/0.1	L/0.1	5.0
Lead	L/0.2	L/0.2	L/0.2	L/0.2	5.0
Mercury	L/0.001	L/0.001	L/0.001	L/0.001	0.2
Selenium	L/0.2	L/0.2	L/0.2	L/0.2	1.0
Silver	L/0.1	L/0.1	L/0.1	L/0.1	5.0
Endrin	L/0.0001	L/0.0001	L/0.0001	L/0.0001	0.02
Methoxychlor	L/0.001	L/0.001	L/0.001	L/0.001	10.0
Toxaphene	L/0.005	L/0.005	L/0.005	L/0.005	0.5
2,4-D	L/0.001	L/0.001	L/0.001	1.	10.0
2,4,5-TP (silvex)	L/0.001	L/0.001	L/0.001	L/0.001	1.0
Lindane	L/0.0001	L/0.0001	L/0.0001	L/0.0001	0.4

	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>MCL</u>
Arsenic	L/0.2	L/0.2	L/0.2	L/0.2	5.0
Barium	0.3	0.3	0.2	0.3	100.
Cadmium	0.02	0.02	L/0.01	L/0.01	1.0
Chromium	L/0.1	L/0.1	L/0.1	L/0.1	5.0
Lead	L/0.2	0.1	L/0.2	L/0.2	5.0
Mercury	L/0.001	L/0.001	L/0.001	L/0.001	0.2
Selenium	L/0.2	L/0.2	L/0.2	L/0.2	1.0
Silver	L/0.1	L/0.1	L/0.1	L/0.1	5.0



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concentration, mg/L (parts per million)

	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>MCL</u>
Endrin	L/0.0001	L/0.0001	L/0.0001	L/0.0001	0.02
Methoxychlor	L/0.001	L/0.001	L/0.001	L/0.001	10.0
Toxaphene	L/0.005	L/0.005	L/0.005	L/0.005	0.5
2,4-D	L/0.001	L/0.001	L/0.001	L/0.001	10.0
2,4,5-TP (silvex)	L/0.001	L/0.001	L/0.001	L/0.001	1.0
Lindane	L/0.0001	L/0.0001	L/0.0001	L/0.0001	0.4

Priority Pollutants

Samples were analyzed for priority pollutants in accordance with Test Methods for Evaluating Solid Waste, (SW-846), U.S.E.P.A., 1982, Methods 8240 (volatile organics), 8270 (semi-volatile extractables), 8080 (pesticides and PCB's), 9010 (cyanide), and the 7000 series (metals analysis). Phenol analysis was in accordance with Method 420.2, Methods for Chemical Analysis of Water & Wastes, U.S.E.P.A., March, 1979.

parts per million (mg/kg), dry basis

<u>Inorganics</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Antimony	L/2.	L/2.	L/2.	L/2.
Arsenic	22.	14.	13.	7.
Beryllium	0.6	0.5	0.5	0.4
Cadmium	4.4	2.6	2.7	0.3
Chromium	100.	50.	55.	40.
Copper	200.	120.	90.	35.
Lead	360.	180.	140.	24.
Mercury	2.4	0.8	1.1	0.2
Nickel	70.	50.	60.	60.
Selenium	1.0	0.5	L/0.5	L/0.5
Silver	6.2	1.8	1.8	0.6
Thallium	L/0.5	L/0.5	L/0.5	L/0.5
Zinc	680.	250.	230.	71.
Total Cyanide	L/0.5	L/0.5	L/0.5	L/0.5
Total Phenol	1.5	L/0.5	0.6	1.1



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parts per million (mg/kg), dry basis

	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>Method Blank</u>
Antimony	L/2.	L/2.	L/2.	L/2.	L/2.
Arsenic	15.	15.	8.	8.	L/0.5
Beryllium	0.4	0.3	L/0.1	L/0.1	L/0.1
Cadmium	1.9	1.8	0.8	0.6	L/0.1
Chromium	65.	60.	30.	30.	L/5.
Copper	120.	100.	45.	35.	L/1.
Lead	200.	180.	100.	43.	L/1.
Mercury	2.7	2.1	0.3	2.3	L/0.1
Nickel	70.	60.	40.	30.	L/10.
Selenium	0.6	0.7	L/0.5	L/0.5	L/0.5
Silver	2.1	2.2	0.7	0.7	L/0.1
Thallium	L/0.5	L/0.5	L/0.5	L/0.5	L/0.5
Zinc	260.	230.	99.	81.	L/1.
Total Cyanide	L/0.5	L/0.5	L/0.5	L/0.5	L/0.5
Total Phenol	L/0.5	L/0.5	L/0.5	L/0.5	L/0.5

parts per billion (ug/kg), dry basis

Volatile Organics (by GC/MS)

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Chloromethane	L/5.	L/5.	L/5.	L/5.
Bromomethane	L/5.	L/5.	L/5.	L/5.
Vinyl Chloride	L/5.	L/5.	L/5.	L/5.
Chloroethane	L/5.	L/5.	L/5.	L/5.
Methylene Chloride	450.	590.	310.	300.
Acrolein	L/50.	L/50.	L/50.	L/50.
*Acetone	730.	620.	290.	2300.
Acrylonitrile	L/50.	L/50.	L/50.	L/50.
*Carbon Disulfide	L/5.	L/5.	L/5.	L/5.
1,1-Dichloroethylene	L/5.	L/5.	L/5.	L/5.
1,1-Dichloroethane	L/5.	L/5.	L/5.	L/5.
trans-1,2-Dichloroethylene	L/5.	L/5.	L/5.	L/5.
Chloroform	L/5.	L/5.	L/5.	L/5.



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parts per billion (ug/kg), dry basis

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
*2-Butanone	L/5.	L/5.	L/5.	L/5.
1,2-Dichloroethane	L/5.	L/5.	L/5.	L/5.
1,1,1-Trichloroethane	L/5.	L/5.	L/5.	L/5.
*Vinyl Acetate	L/5.	L/5.	L/5.	L/5.
Bromodichloromethane	L/5.	L/5.	L/5.	L/5.
Carbon Tetrachloride	L/5.	L/5.	L/5.	L/5.
1,2-Dichloropropane	L/5.	L/5.	L/5.	L/5.
Trichloroethylene	L/5.	L/5.	L/5.	L/5.
Benzene	L/5.	L/5.	L/5.	L/5.
Chlorodibromomethane	L/5.	L/5.	L/5.	L/5.
1,1,2-Trichloroethane	L/5.	L/5.	L/5.	L/5.
2-Chloroethyl vinyl ether	L/5.	L/5.	L/5.	L/5.
Bromoform	L/5.	L/5.	L/5.	L/5.
*4-Methyl-2-pentanone	L/5.	L/5.	L/5.	L/5.
*2-Hexanone	L/5.	L/5.	L/5.	L/5.
1,1,2,2-Tetrachloroethane	L/5.	L/5.	L/5.	L/5.
Tetrachloroethylene	L/5.	L/5.	L/5.	L/5.
Toluene	L/5.	L/5.	L/5.	L/5.
Chlorobenzene	L/5.	L/5.	L/5.	L/5.
trans-1,3-Dichloropropene	L/5.	L/5.	L/5.	L/5.
Ethylbenzene	L/5.	L/5.	L/5.	L/5.
cis-1,3-Dichloropropene	L/5.	L/5.	L/5.	L/5.
Styrene	L/5.	L/5.	L/5.	L/5.
o-Xylene	L/5.	L/5.	L/5.	L/5.
	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
Chloromethane	L/5.	L/5.	L/5.	L/5.
Bromomethane	L/5.	L/5.	L/5.	L/5.
Vinyl Chloride	L/5.	L/5.	L/5.	L/5.
Chloroethane	L/5.	L/5.	L/5.	L/5.
Methylene Chloride	350.	240.	110.	47.
Acrolein	L/50.	L/50.	L/50.	L/50.



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parts per billion (ug/kg), dry basis

	5	6	7	8
*Acetone	1300.	910.	800.	110.
Acrylonitrile	L/50.	L/50.	L/50.	L/50.
*Carbon Disulfide	L/5.	L/5.	L/5.	L/5.
1,1-Dichloroethylene	L/5.	L/5.	L/5.	L/5.
1,1-Dichloroethane	L/5.	L/5.	L/5.	L/5.
trans-1,2-Dichloroethylene	L/5.	L/5.	L/5.	L/5.
Chloroform	L/5.	L/5.	L/5.	L/5.
*2-Butanone	L/5.	L/5.	L/5.	L/5.
1,2-Dichloroethane	L/5.	L/5.	47.	L/5.
1,1,1-Trichloroethane	L/5.	L/5.	L/5.	L/5.
*Vinyl Acetate	L/5.	L/5.	L/5.	L/5.
Bromodichloromethane	L/5.	L/5.	L/5.	L/5.
Carbon Tetrachloride	L/5.	L/5.	L/5.	L/5.
1,2-Dichloropropane	L/5.	L/5.	L/5.	L/5.
Trichloroethylene	L/5.	L/5.	L/5.	L/5.
Benzene	L/5.	L/5.	L/5.	L/5.
Chlorodibromomethane	L/5.	L/5.	L/5.	L/5.
1,1,2-Trichloroethane	L/5.	L/5.	L/5.	L/5.
2-Chloroethyl vinyl ether	L/5.	L/5.	L/5.	L/5.
Bromoform	L/5.	L/5.	L/5.	L/5.
*4-Methyl-2-pentanone	L/5.	L/5.	L/5.	L/5.
*2-Hexanone	L/5.	L/5.	L/5.	L/5.
1,1,2,2-Tetrachloroethane	L/5.	L/5.	L/5.	L/5.
Tetrachloroethylene	L/5.	L/5.	L/5.	L/5.
Toluene	L/5.	L/5.	L/5.	L/5.
Chlorobenzene	L/5.	L/5.	L/5.	L/5.
trans-1,3-Dichloropropene	L/5.	L/5.	L/5.	L/5.
Ethylbenzene	L/5.	L/5.	L/5.	L/5.
cis-1,3-Dichloropropene	L/5.	L/5.	L/5.	L/5.
Styrene	L/5.	L/5.	L/5.	L/5.
o-Xylene	L/5.	L/5.	L/5.	L/5.



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parts per billion (ug/kg), dry basis

	<u>Field Blank</u>	<u>Soil Blank1</u>	<u>Soil Blank2</u>	<u>Soil Blank3</u>
Chloromethane	L/1.	L/1.	L/1.	L/1.
Bromomethane	L/1.	L/1.	L/1.	L/1.
Vinyl Chloride	L/1.	L/1.	L/1.	L/1.
Chloroethane	L/1.	L/1.	L/1.	L/1.
Methylene Chloride	10.	9.	9.	trace ¹
Acrolein	L/10.	L/10.	L/10.	L/10.
*Acetone	10.	14.	10.	trace ¹
Acrylonitrile	L/10.	L/10.	L/10.	L/10.
*Carbon Disulfide	L/1.	L/1.	L/1.	L/1.
1,1-Dichloroethylene	L/1.	L/1.	L/1.	L/1.
1,1-Dichloroethane	L/1.	L/1.	L/1.	L/1.
trans-1,2-Dichloroethylene	L/1.	L/1.	L/1.	L/1.
Chloroform	L/1.	L/1.	L/1.	L/1.
*2-Butanone	L/1.	L/1.	L/1.	L/1.
1,2-Dichloroethane	L/1.	L/1.	L/1.	L/1.
1,1,1-Trichloroethane	L/1.	L/1.	L/1.	L/1.
*Vinyl Acetate	L/1.	L/1.	L/1.	L/1.
Bromodichloromethane	L/1.	L/1.	L/1.	L/1.
Carbon Tetrachloride	L/1.	L/1.	L/1.	L/1.
1,2-Dichloropropane	L/1.	L/1.	L/1.	L/1.
Trichloroethylene	L/1.	L/1.	L/1.	L/1.
Benzene	L/1.	L/1.	L/1.	L/1.
Chlorodibromomethane	L/1.	L/1.	L/1.	L/1.
1,1,2-Trichloroethane	L/1.	L/1.	L/1.	L/1.
2-Chloroethyl vinyl ether	L/1.	L/1.	L/1.	L/1.
Bromoform	L/1.	L/1.	L/1.	L/1.
*4-Methyl-2-pentanone	L/1.	L/1.	L/1.	L/1.
*2-Hexanone	L/1.	L/1.	L/1.	L/1.
1,1,2,2-Tetrachloroethane	L/1.	L/1.	L/1.	L/1.
Tetrachloroethylene	L/1.	L/1.	L/1.	L/1.



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parts per billion (ug/kg), dry basis

	<u>Field Blank</u>	<u>Soil Blank1</u>	<u>Soil Blank2</u>	<u>Soil Blank3</u>
Toluene	L/1.	L/1.	L/1.	L/1.
Chlorobenzene	L/1.	L/1.	L/1.	L/1.
trans-1,3-Dichloropropene	L/1.	L/1.	L/1.	L/1.
Ethylbenzene	L/1.	L/1.	L/1.	L/1.
cis-1,3-Dichloropropene	L/1.	L/1.	L/1.	L/1.
Styrene	L/1.	L/1.	L/1.	L/1.
o-Xylene	L/1.	L/1.	L/1.	L/1.

parts per billion (ug/kg), dry basis

<u>Extractables (by GC/MS)</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
N-nitrosodimethylamine	L/200.	L/200.	L/200.	L/200.	L/200.
Bis(2-chloroethyl)ether	L/200.	L/200.	L/200.	L/200.	L/200.
2-Chlorophenol	L/200.	L/200.	L/200.	L/200.	L/200.
Phenol	L/200.	L/200.	L/200.	L/200.	L/200.
1,3-Dichlorobenzene	L/200.	L/200.	L/200.	L/200.	L/200.
1,4-Dichlorobenzene	L/200.	L/200.	L/200.	L/200.	L/200.
1,2-Dichlorobenzene	L/200.	L/200.	L/200.	L/200.	L/200.
Bis(2-chloroisopropyl)ether	L/200.	L/200.	L/200.	L/200.	L/200.
Hexachloroethane	L/200.	L/200.	L/200.	L/200.	L/200.
N-nitroso-di-n-propylamine	L/200.	L/200.	L/200.	L/200.	L/200.
Nitrobenzene	L/200.	L/200.	L/200.	L/200.	L/200.
Isophorone	L/200.	L/200.	L/200.	L/200.	L/200.
2-Nitrophenol	L/200.	L/200.	L/200.	L/200.	L/200.
2,4-Dimethylphenol	L/200.	L/200.	L/200.	L/200.	L/200.
Bis(2-chloroethoxy)methane	L/200.	L/200.	L/200.	L/200.	L/200.
2,4-Dichlorophenol	L/200.	L/200.	L/200.	L/200.	L/200.
1,2,4-Trichlorobenzene	L/200.	L/200.	L/200.	L/200.	L/200.
Naphthalene	240.	240.	L/200.	L/200.	L/200.
Hexachlorobutadiene	L/200.	L/200.	L/200.	L/200.	L/200.
4-Chloro-m-cresol	L/200.	L/200.	L/200.	L/200.	L/200.



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parts per billion (ug/kg), dry basis

	1	2	3	4	5
Hexachlorocyclopentadiene	L/200.	L/200.	L/200.	L/200.	L/200.
2,4,6-Trichlorophenol	L/200.	L/200.	L/200.	L/200.	L/200.
2-Chloronaphthalene	L/200.	L/200.	L/200.	L/200.	L/200.
Acenaphthylene	L/200.	260.	L/200.	L/200.	L/200.
Dimethylphthalate	L/200.	L/200.	L/200.	L/200.	L/200.
2,6-Dinitrotoluene	L/200.	L/200.	L/200.	L/200.	L/200.
Acenaphthene	260.	L/200.	220.	290.	L/200.
2,4-Dinitrophenol	L/200.	L/200.	L/200.	L/200.	L/200.
2,4-Dinitrotoluene	L/200.	L/200.	L/200.	L/200.	L/200.
4-Nitrophenol	L/200.	L/200.	L/200.	L/200.	L/200.
Fluorene	370.	L/200.	220.	250.	L/200.
4-Chlorophenyl phenyl ether	L/200.	L/200.	L/200.	L/200.	L/200.
Diethylphthalate	L/200.	L/200.	L/200.	L/200.	L/200.
4,6-Dinitro-o-cresol	L/200.	L/200.	L/200.	L/200.	L/200.
1,2-Diphenylhydrazine	L/200.	L/200.	L/200.	L/200.	L/200.
4-Bromophenyl phenyl ether	L/200.	L/200.	L/200.	L/200.	L/200.
Hexachlorobenzene	L/200.	L/200.	L/200.	L/200.	L/200.
Pentachlorophenol	L/200.	L/200.	L/200.	L/200.	L/200.
Phenanthrene	1100.	680.	870.	860.	710.
Anthracene	1500.	960.	770.	700.	560.
Dibutylphthalate	L/200.	L/200.	L/200.	L/200.	L/200.
Fluoranthene	7200.	3200.	2400.	2200.	940.
Pyrene	11000.	2200.	1800.	2100.	5200.
Benzidine	L/200.	L/200.	L/200.	L/200.	L/200.
Butyl benzyl phthalate	L/200.	L/200.	L/200.	L/200.	L/200.
Benzo(a)anthracene	2800.	1200.	1200.	1100.	680.
Chrysene	3200.	1800.	1700.	1600.	1200.
3,3'-Dichlorobenzidine	L/200.	L/200.	L/200.	L/200.	L/200.
Bis(2-ethylhexyl)phthalate	2500.	2000.	850.	850.	730.
N-nitrosodiphenylamine	L/200.	L/200.	L/200.	L/200.	L/200.
Di-n-octyl phthalate	L/200.	L/200.	L/200.	L/200.	L/200.
Benzo(b)fluoranthene	L/200.	1800.	1100.	1050.	1800.
Benzo(k)fluoranthene	L/200.	1500.	710.	920.	1400.



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parts per billion (ug/kg), dry basis

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Benzo(a)pyrene	2000.	1700.	1000.	1100.	2000.
Indeno(1,2,3-cd)pyrene	1200.	520.	340.	L/200.	620.
Dibenzo(ah)anthracene	L/200.	L/200.	L/200.	L/200.	L/200.
Benzo(ghi)perylene	1400.	570.	370.	L/200.	800.
*Aniline	L/200.	L/200.	L/200.	L/200.	L/200.
*Benzoic Acid	L/200.	L/200.	L/200.	L/200.	L/200.
*Benzyl Alcohol	L/200.	L/200.	L/200.	L/200.	L/200.
*4-Chloroaniline	L/200.	L/200.	L/200.	L/200.	L/200.
*Dibenzofuran	L/200.	L/200.	L/200.	L/200.	L/200.
*2-Methylnaphthalene	L/200.	L/200.	L/200.	L/200.	L/200.
*2-Methylphenol	L/200.	L/200.	L/200.	L/200.	L/200.
*4-Methylphenol	L/200.	L/200.	L/200.	L/200.	L/200.
*2-Nitroaniline	L/200.	L/200.	L/200.	L/200.	L/200.
*3-Nitroaniline	L/200.	L/200.	L/200.	L/200.	L/200.
*4-Nitroaniline	L/200.	L/200.	L/200.	L/200.	L/200.
*2,4,5-Trichlorophenol	L/200.	L/200.	L/200.	L/200.	L/200.
	<u>6</u>	<u>7</u>	<u>8</u>	<u>Method</u> <u>Blank</u>	
N-nitrosodimethylamine	L/200.	L/200.	L/200.	L/100.	
Bis(2-chloroethyl)ether	L/200.	L/200.	L/200.	L/100.	
2-Chlorophenol	L/200.	L/200.	L/200.	L/100.	
Phenol	L/200.	L/200.	L/200.	L/100.	
1,3-Dichlorobenzene	L/200.	L/200.	L/200.	L/100.	
1,4-Dichlorobenzene	L/200.	L/200.	L/200.	L/100.	
1,2-Dichlorobenzene	L/200.	L/200.	L/200.	L/100.	
Bis(2-chloroisopropyl)ether	L/200.	L/200.	L/200.	L/100.	
Hexachloroethane	L/200.	L/200.	L/200.	L/100.	
N-nitroso-di-n-propylamine	L/200.	L/200.	L/200.	L/100.	
Nitrobenzene	L/200.	L/200.	L/200.	L/100.	
Isophorone	L/200.	L/200.	L/200.	L/100.	



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	<u>6</u>	<u>7</u>	<u>8</u>	<u>Method</u> <u>Blank</u>
2-Nitrophenol	L/200.	L/200.	L/200.	L/100.
2,4-Dimethylphenol	L/200.	L/200.	L/200.	L/100.
Bis(2-chloroethoxy)methane	L/200.	L/200.	L/200.	L/100.
2,4-Dichlorophenol	L/200.	L/200.	L/200.	L/100.
1,2,4-Trichlorobenzene	L/200.	L/200.	L/200.	L/100.
Naphthalene	L/200.	L/200.	L/200.	L/100.
Hexachlorobutadiene	L/200.	L/200.	L/200.	L/100.
4-Chloro-m-cresol	L/200.	L/200.	L/200.	L/100.
Hexachlorocyclopentadiene	L/200.	L/200.	L/200.	L/100.
2,4,6-Trichlorophenol	L/200.	L/200.	L/200.	L/100.
2-Chloronaphthalene	L/200.	L/200.	L/200.	L/100.
Acenaphthylene	L/200.	L/200.	L/200.	L/100.
Dimethylphthalate	L/200.	L/200.	L/200.	L/100.
2,6-Dinitrotoluene	L/200.	L/200.	L/200.	L/100.
Acenaphthene	L/200.	220.	L/200.	L/100.
2,4-Dinitrophenol	L/200.	L/200.	L/200.	L/100.
2,4-Dinitrotoluene	L/200.	L/200.	L/200.	L/100.
4-Nitrophenol	L/200.	L/200.	L/200.	L/100.
Fluorene	L/200.	L/200.	L/200.	L/100.
4-Chlorophenyl phenyl ether	L/200.	L/200.	L/200.	L/100.
Diethylphthalate	L/200.	L/200.	L/200.	L/100.
4,6-Dinitro-o-cresol	L/200.	L/200.	L/200.	L/100.
1,2-Diphenylhydrazine	L/200.	L/200.	L/200.	L/100.
4-Bromophenyl phenyl ether	L/200.	L/200.	L/200.	L/100.
Hexachlorobenzene	L/200.	L/200.	L/200.	L/100.
Pentachlorophenol	L/200.	L/200.	L/200.	L/100.
Phenanthrene	530.	550.	400.	L/100.
Anthracene	780.	420.	430.	L/100.
Dibutylphthalate	L/200.	L/200.	L/200.	L/100.
Fluoranthene	720.	1100.	530.	L/100.
Pyrene	4200.	1900.	2100.	L/100.
Benzidine	L/200.	L/200.	L/200.	L/100.



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	<u>6</u>	<u>7</u>	<u>8</u>	<u>Method</u> <u>Blank</u>
Butyl benzyl phthalate	L/200.	L/200.	L/200.	L/100.
Benzo(a)anthracene	590.	770.	430.	L/100.
Chrysene	1100.	1300.	890.	L/100.
3,3'-Dichlorobenzidine	L/200.	L/200.	L/200.	L/100.
Bis(2-ethylhexyl)phthalate	440.	1200.	300.	L/100.
N-nitrosodiphenylamine	L/200.	L/200.	L/200.	L/100.
Di-n-octyl phthalate	L/200.	L/200.	L/200.	L/100.
Benzo(b)fluoranthene	2000.	1100.	1200.	L/100.
Benzo(k)fluoranthene	1400.	990.	870.	L/100.
Benzo(a)pyrene	2400.	1000.	1200.	L/100.
Indeno(1,2,3-cd)pyrene	660.	310.	360.	L/100.
Dibenzo(ah)anthracene	L/200.	L/200.	L/200.	L/100.
Benzo(ghi)perylene	750.	340.	390.	L/100.
*Aniline	L/200.	L/200.	L/200.	L/100.
*Benzoic Acid	L/200.	L/200.	L/200.	L/100.
*Benzyl Alcohol	L/200.	L/200.	L/200.	L/100.
*4-Chloroaniline	L/200.	L/200.	L/200.	L/100.
*Dibenzofuran	L/200.	L/200.	L/200.	L/100.
*2-Methylnaphthalene	L/200.	L/200.	L/200.	L/100.
*2-Methylphenol	L/200.	L/200.	L/200.	L/100.
*4-Methylphenol	L/200.	L/200.	L/200.	L/100.
*2-Nitroaniline	L/200.	L/200.	L/200.	L/100.
*3-Nitroaniline	L/200.	L/200.	L/200.	L/100.
*4-Nitroaniline	L/200.	L/200.	L/200.	L/100.
*2,4,5-Trichlorophenol	L/200.	L/200.	L/200.	L/100.



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	<u>parts per billion (ug/kg)</u>				
<u>Pesticides (by GC/ECD)</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
alpha-BHC	L/1.	L/1.	L/1.	L/1.	L/1.
beta-BHC	L/1.	L/1.	L/1.	L/1.	L/1.
delta-BHC	L/1.	L/1.	L/1.	L/1.	L/1.
gamma-BHC (lindane)	L/1.	L/1.	L/1.	L/1.	L/1.
heptachlor	L/1.	L/1.	L/1.	L/1.	L/1.
aldrin	L/1.	19.	L/1.	L/1.	L/1.
heptachlor epoxide	L/1.	L/1.	L/1.	L/1.	L/1.
dieldrin	L/1.	L/1.	L/1.	L/1.	L/1.
4,4'-DDE	42.	L/1.	L/1.	33.	L/1.
4,4'-DDD	39.	47.	4.	13.	24.
endosulfan sulfate	L/1.	L/1.	L/1.	L/1.	L/1.
4,4'-DDT	L/1.	L/1.	L/1.	L/1.	L/1.
chlordane	L/1.	L/1.	L/1.	L/1.	L/1.
alpha endosulfan	L/1.	L/1.	L/1.	L/1.	L/1.
beta endosulfan	L/1.	L/1.	L/1.	L/1.	L/1.
endrin	L/1.	L/1.	L/1.	L/1.	L/1.
endrin aldehyde	L/1.	L/1.	L/1.	L/1.	L/1.
toxaphene	L/50.	L/50.	L/50.	L/50.	L/50.
PCB 1016	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1221	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1232	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1242	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1248	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1254	L/20.	L/20.	140.	L/20.	200.
PCB 1260	2500.	420.	L/20.	750.	L/20.
	<u>6</u>	<u>7</u>	<u>8</u>	<u>Method Blank</u>	
alpha-BHC	L/1.	L/1.	L/1.	L/1.	
beta-BHC	L/1.	L/1.	L/1.	L/1.	
delta-BHC	L/1.	L/1.	L/1.	L/1.	
gamma-BHC (lindane)	L/1.	L/1.	L/1.	L/1.	
heptachlor	L/1.	L/1.	L/1.	L/1.	



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parts per billion (ug/kg)

	<u>6</u>	<u>7</u>	<u>8</u>	<u>Method</u> <u>Blank</u>
aldrin	L/1.	L/1.	L/1.	L/1.
heptachlor epoxide	L/1.	L/1.	L/1.	L/1.
dieldrin	L/1.	L/1.	L/1.	L/1.
4,4'-DDE	L/1.	L/1.	L/1.	L/1.
4,4'-DDD	11.	22.	19.	L/1.
endosulfan sulfate	L/1.	L/1.	L/1.	L/1.
4,4'-DDT	L/1.	L/1.	L/1.	L/1.
chlordane	L/1.	L/1.	L/1.	L/1.
alpha endosulfan	L/1.	L/1.	L/1.	L/1.
beta endosulfan	L/1.	L/1.	L/1.	L/1.
endrin	L/1.	L/1.	L/1.	L/1.
endrin aldehyde	L/1.	L/1.	L/1.	L/1.
toxaphene	L/50.	L/50.	L/50.	L/50.
PCB 1016	L/20.	L/20.	L/20.	L/20.
PCB 1221	L/20.	L/20.	L/20.	L/20.
PCB 1232	L/20.	L/20.	L/20.	L/20.
PCB 1242	L/20.	L/20.	L/20.	L/20.
PCB 1248	L/20.	L/20.	L/20.	L/20.
PCB 1254	140.	160.	100.	L/20.
PCB 1260	L/20.	L/20.	L/20.	L/20.



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WATER ANALYSES

Prior to filtering, samples were tested as follows:

	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>
Turbidity, Nephelometer Units	0.4	0.5	0.2	0.3	0.2

Samples were then filtered and preserved and tested as shown:

Salinity, parts per thousand	27.88	26.98	28.31	28.62	28.31
---------------------------------	-------	-------	-------	-------	-------

Samples were analyzed for priority pollutants in accordance with Test Methods for Evaluating Solid Waste, (SW-846), U.S.E.P.A., 1982, Methods 8240 (volatile organics), 8270 (semi-volatile extractables), 8080 (pesticides and PCB's), 9010 (cyanide), and the 7000 series (metals analysis). Phenol analysis was in accordance with Method 420.2, Methods for Chemical Analysis of Water & Wastes, U.S.E.P.A., March, 1979.

Inorganics

parts per billion (ug/L)

	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	Method Blank
Antimony	L/5.	L/5.	L/5.	L/5.	L/5.	L/5.
Arsenic	L/5.	L/5.	L/5.	L/5.	L/5.	L/5.
Beryllium	L/1.	L/1.	L/1.	L/1.	L/1.	---
Cadmium	L/2.	L/2.	L/2.	L/2.	L/2.	L/2.
Chromium	22.	23.	22.	20.	24.	L/2.



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parts per billion (ug/L)

	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>Method Blank</u>
Copper	L/5.	L/5.	L/5.	L/5.	L/5.	10.
Lead	L/5.	L/5.	L/5.	L/5.	L/5.	L/5.
Mercury	L/2.	L/2.	L/2.	L/2.	L/2.	L/2.
Nickel	L/5.	L/5.	L/5.	L/5.	L/5.	L/5.
Selenium	L/5.	L/5.	L/5.	L/5.	L/5.	L/5.
Silver	3.	2.	L/2.	L/2.	L/2.	L/2.
Thallium	L/500.	L/500.	L/500.	L/500.	L/500.	L/500.
Zinc	L/5.	L/5.	L/5.	L/5.	L/5.	30.
Total Cyanide	L/5.	L/5.	L/5.	L/5.	L/5.	L/5.
Total Phenol	L/5.	6.	L/5.	L/5.	L/5.	L/5.

Volatile Organics (by GC/MS)

parts per billion (ug/L)

	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>Field Blank</u>
Chloromethane	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Bromomethane	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Vinyl Chloride	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Chloroethane	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Methylene Chloride	trace2	trace2	trace2	trace2	trace2	10.
Acrolein	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
*Acetone	trace2	trace2	trace2	trace2	trace2	10.
Acrylonitrile	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
*Carbon Disulfide	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
1,1-Dichloroethylene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
1,1-Dichloroethane	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
trans-1,2-Dichloroethylene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Chloroform	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
*2-Butanone	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
1,2-Dichloroethane	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
1,1,1-Trichloroethane	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.



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parts per billion (ug/L)

	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>Field Blank</u>
*Vinyl Acetate	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Bromodichloromethane	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Carbon Tetrachloride	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
1,2-Dichloropropane	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Trichloroethylene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Benzene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Chlorodibromomethane	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
1,1,2-Trichloroethane	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
2-Chloroethyl vinyl ether	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Bromoform	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
*4-Methyl-2-pentanone	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
*2-Hexanone	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
1,1,2,2-Tetrachloroethane	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Tetrachloroethylene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Toluene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Chlorobenzene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
trans-1,3-Dichloropropene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Ethylbenzene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
cis-1,3-Dichloropropene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Styrene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
o-Xylene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.

Extractables (by GC/MS)

parts per billion (ug/L)

	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>Method Blank</u>
N-nitrosodimethylamine	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Bis(2-chloroethyl)ether	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
2-Chlorophenol	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.



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parts per billion (ug/L)

	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>Method Blank</u>
Phenol	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
1,3-Dichlorobenzene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
1,4-Dichlorobenzene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
1,2-Dichlorobenzene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Bis(2-chloroisopropyl)ether	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Hexachloroethane	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
N-nitroso-di-n-propylamine	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Nitrobenzene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Isophorone	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
2-Nitrophenol	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
2,4-Dimethylphenol	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Bis(2-chloroethoxy)methane	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
2,4-Dichlorophenol	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
1,2,4-Trichlorobenzene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Naphthalene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Hexachlorobutadiene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
4-Chloro-m-cresol	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Hexachlorocyclopentadiene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
2,4,6-Trichlorophenol	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
2-Chloronaphthalene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Acenaphthylene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Dimethylphthalate	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
2,6-Dinitrotoluene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Acenaphthene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
2,4-Dinitrophenol	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
2,4-Dinitrotoluene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
4-Nitrophenol	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Fluorene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
4-Chlorophenyl phenyl ether	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Diethylphthalate	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
4,6-Dinitro-o-cresol	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
1,2-Diphenylhydrazine	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.



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parts per billion (ug/L)

	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>Method Blank</u>
4-Bromophenyl phenyl ether	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Hexachlorobenzene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Pentachlorophenol	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Phenanthrene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Anthracene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Dibutylphthalate	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Fluoranthene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Pyrene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Benzidine	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Butyl benzyl phthalate	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Benzo(a)anthracene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Chrysene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
3,3'-Dichlorobenzidine	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Bis(2-ethylhexyl)phthalate	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
N-nitrosodiphenylamine	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Di-n-octyl phthalate	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Benzo(b)fluoranthene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Benzo(k)fluoranthene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Benzo(a)pyrene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Indeno(1,2,3-cd)pyrene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Dibenzo(ah)anthracene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Benzo(ghi)perylene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
*Aniline	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
*Benzoic Acid	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
*Benzyl Alcohol	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
*4-Chloroaniline	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
*Dibenzofuran	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
*2-Methylnaphthalene	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
*2-Methylphenol	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.



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parts per billion (ug/L)

	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>Method Blank</u>
*4-Methylphenol	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
*2-Nitroaniline	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
*3-Nitroaniline	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
*4-Nitroaniline	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
*2,4,5-Trichlorophenol	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.

Pesticides (by GC/ECD)

parts per billion (ug/L)

	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>Method Blank</u>
alpha-BHC	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
beta-BHC	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
delta-BHC	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
gamma-BHC (lindane)	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
heptachlor	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
aldrin	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
heptachlor epoxide	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
dieldrin	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
4,4'-DDE	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
4,4'-DDD	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
endosulfan sulfate	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
4,4'-DDT	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
chlordane	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
alpha endosulfan	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
beta endosulfan	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
endrin	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
endrin aldehyde	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01	L/0.01
toxaphene	L/1.0	L/1.0	L/1.0	L/1.0	L/1.0	L/1.0



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parts per billion (ug/L)

	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	Method Blank
PCB 1016	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2
PCB 1221	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2
PCB 1232	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2
PCB 1242	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2
PCB 1248	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2
PCB 1254	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2
PCB 1260	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2

Key

L/ indicates "less than"

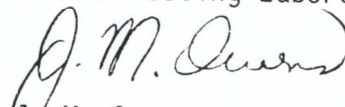
* indicates Additional compounds from the EPA's Hazardous Substances List.

trace1 indicates a number between 1-10 ug/kg.

trace2 indicates a number between 2-10 ug/L.

Respectfully submitted,

Laucks Testing Laboratories, Inc.


J. M. Owens

JMO:veg



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APPENDIX A

Spike Quality Control Report, Inorganics

parts per million (mg/kg), dry basis

<u>Sample</u>	<u>Analyte</u>	<u>Sample Found</u>	<u>Spike Level</u>	<u>Sample & Spike Found</u>	<u>% Recovery</u>
6	Silver	2.2	2.4	4.1	79.
6	Cyanide	L/0.5	2.1	1.0	48.
6	Arsenic	14.6	2.5	17.0	96.
6	Phenol	L/0.5	2.9	3.0	103.
6	Cadmium	1.8	0.5	2.3	100.
6	Selenium	0.7	2.5	3.2	100.
6	Antimony	L/2.	10.	4.1	41.
6	Beryllium	0.3	0.5	0.9	120.
6	Copper	100.	100.	210.	110.
6	Lead	180.	250.	450.	108.
6	Nickel	60.	50.	115.	110.
6	Thallium	L/0.5	2.5	2.5	100.
6	Zinc	230.	100.	330.	100.
6	Oil & Grease	0.91	1.00	1.94	103.
6	TOH	L/15.	54.	57.	106.
6	Mercury	2.1	2.	4.8	130.

parts per million (mg/L)

6	Arsenic	L/0.2	1.0	1.0	100.
6	Barium	0.3	1.0	1.2	90.
6	Cadmium	0.02	1.0	0.99	97.
6	Chromium	L/0.1	1.0	0.9	90.
6	Lead	0.1	1.0	1.1	100.
6	Selenium	L/0.2	1.0	1.0	100.
6	Silver	L/0.1	1.0	0.3	30.
6	Mercury	L/0.005	0.25	0.28	112.



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APPENDIX B

Spike Quality Control Report, Organics

<u>Sample</u>	<u>Analyte</u>	<u>Sample Found</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limits</u>
<u>parts per billion (ug/kg)</u>						
6 MS	Lindane	L/1.	8.0	7.0	87.5	46-127
	Heptachlor	L/1.	8.0	13.8	173.	35-130*
	Aldrin	L/1.	8.0	15.7	196.	34-132
	Dieldrin	L/1.	20.0	26.2	131.	31-134
	Endrin	L/1.	20.0	29.0	145.	42-139
	DDT	L/1.	20.0	184.	920.	23-134*
<u>parts per billion (ug/L)</u>						
11 MS	Lindane	L/0.01	0.0667	0.0470	70.4	46-127
	Heptachlor	L/0.01	0.0667	0.0694	104.	34-130
	Aldrin	L/0.01	0.0667	0.0598	89.6	34-132
	Dieldrin	L/0.01	0.167	0.145	86.9	31-134
	Endrin	L/0.01	0.167	0.128	76.8	42-139
	DDT	L/0.01	0.167	0.182	109.	23-134
8 MS	2,4-D	L/0.001	0.02	0.0206	103.	**
	2,4,5-TP	L/0.001	0.01	0.00923	92.3	**
8 MSD	2,4-D	L/0.001	0.02	0.0181	90.3	**
	2,4,5-TP	L/0.001	0.01	0.00830	83.0	**
6 MS	Endrin	L/0.0001	0.00050	0.00044	87.7	56-121

* Matrix interference

** none established



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APPENDIX C

Matrix Spike/Matrix Spike Duplicate Report

<u>parts per billion (ug/L)</u>					
<u>Sample</u>	<u>Analyte</u>	<u>Spike Added</u>	<u>Sample Result</u>	<u>MS Result</u>	<u>% Rec</u>
11	Cyanide	50.	L/5.	56.	112.
11	Chromium	10.	22.	31.	90.
11	Mercury	100.	L/2.	98.	98.
11	Phenol	50.	L/5.	54.	108.
11	Selenium	20.	L/5.	20.	100.
11	Arsenic	20.	L/5.	25.	125.
11	Antimony	50.	L/5.	45.	90.
11	Thallium	2500.	L/500.	1400.	56.
11	Cadmium	25.	L/2.	21.	84.
11	Lead	25.	L/5.	25.	100.
11	Silver	25.	L/2.	26.	104.
11	Zinc	25.	L/5.	21.	84.
11	Copper	25.	L/5.	26.	104.
11	Nickel	25.	L/5.	20.	80.
11	Beryllium	10.	L/1.	9.	90.



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APPENDIX D

Surrogate Recovery Quality Control Report

Listed below are surrogate (chemically similar) compounds utilized in the analysis of volatile and organic compounds. The surrogates are added to every sample prior extraction and analysis to monitor for matrix effects, purging efficiency, and sample processing errors. The control limits represent the 95% confidence interval established in our laboratory through repetitive analysis of these sample types.

parts per billion (ug/kg)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
1	d4-1,2-Dichloroethane	461.	329.	71.4	50-160
	d8-Toluene	461.	458.	99.3	50-160
	p-Bromofluorobenzene	461.	447.	97.0	50-160
2	d4-1,2-Dichloroethane	303.	215.	70.8	50-160
	d8-Toluene	303.	297.	97.9	50-160
	p-Bromofluorobenzene	303.	285.	94.1	50-160
3	d4-1,2-Dichloroethane	369.	263.	71.2	50-160
	d8-Toluene	369.	364.	98.7	50-160
	p-Bromofluorobenzene	369.	343.	92.9	50-160
4	d4-1,2-Dichloroethane	311.	221.	71.1	50-160
	d8-Toluene	311.	299.	96.3	50-160
	p-Bromofluorobenzene	311.	285.	91.7	50-160
5	d4-1,2-Dichloroethane	413.	294.	71.1	50-160
	d8-Toluene	413.	402.	97.3	50-160
	p-Bromofluorobenzene	413.	366.	88.6	50-160
6	d4-1,2-Dichloroethane	283.	199.	70.3	50-160
	d8-Toluene	283.	274.	96.8	50-160
	p-Bromofluorobenzene	283.	248.	87.5	50-160



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PAGE NO. 29

Port of Seattle

LABORATORY NO. 89964

parts per billion (ug/kg)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
7	d4-1,2-Dichloroethane	225.	155.	69.0	50-160
	d8-Toluene	225.	217.	96.5	50-160
	p-Bromofluorobenzene	225.	198.	87.9	50-160
8	d4-1,2-Dichloroethane	147.	103.	69.8	50-160
	d8-Toluene	147.	141.	95.7	50-160
	p-Bromofluorobenzene	147.	131.	88.8	50-160
6 MS	d4-1,2-Dichloroethane	338.	243.	71.9	50-160
	d8-Toluene	338.	319.	94.4	50-160
	p-Bromofluorobenzene	338.	320.	94.7	50-160
method blank soil 1	d4-1,2-Dichloroethane	50.	35.9	71.8	50-160
	d8-Toluene	50.	48.0	96.0	50-160
	p-Bromofluorobenzene	50.	46.7	93.4	50-160
method blank soil 2	d4-1,2-Dichloroethane	50.	35.5	71.0	50-160
	d8-Toluene	50.	47.7	95.4	50-160
	p-Bromofluorobenzene	50.	47.2	94.4	50-160
method blank soil 3	d4-1,2-Dichloroethane	50.	35.4	70.8	50-160
	d8-Toluene	50.	48.5	97.0	50-160
	p-Bromofluorobenzene	50.	46.7	93.4	50-160

parts per billion (ug/L)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
9	d4-1,2-Dichloroethane	50.	48.7	97.4	77-120
	d8-Toluene	50.	47.7	95.4	86-119
	p-Bromofluorobenzene	50.	48.0	96.0	85-121



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<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
10	d4-1,2-Dichloroethane	50.	49.2	98.4	77-120
	d8-Toluene	50.	48.7	97.4	86-119
	p-Bromofluorobenzene	50.	48.4	96.8	85-121
11	d4-1,2-Dichloroethane	50.	48.9	97.8	77-120
	d8-Toluene	50.	47.5	95.0	86-119
	p-Bromofluorobenzene	50.	48.2	96.4	85-121
12	d4-1,2-Dichloroethane	50.	49.1	98.2	77-120
	d8-Toluene	50.	48.9	97.8	86-119
	p-Bromofluorobenzene	50.	48.9	97.8	85-121
13	d4-1,2-Dichloroethane	50.	50.6	101.2	77-120
	d8-Toluene	50.	47.9	95.8	86-119
	p-Bromofluorobenzene	50.	48.4	96.8	85-121
Method Blank	d4-1,2-Dichloroethane	50.	49.4	98.8	77-120
	d8-Toluene	50.	48.0	96.0	86-119
	p-Bromofluorobenzene	50.	47.7	95.4	85-121
Field Blank	d4-1,2-Dichloroethane	50.	45.4	90.8	77-120
	d8-Toluene	50.	47.4	94.8	86-119
	p-Bromofluorobenzene	50.	46.3	92.6	85-121
11 MS	d4-1,2-Dichloroethane	50.	45.2	90.4	77-120
	d8-Toluene	50.	47.1	94.2	86-119
	p-Bromofluorobenzene	50.	48.7	97.4	85-121



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parts per billion (ug/kg)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
1	2-Fluorophenol	4004.	3086.	77.1	24-133
	2-Fluoroaniline	2008.	433.	21.6	---
	d5-Phenol	4000.	3233.	80.8	20-122
	2-Bromophenol	4000.	3124.	78.1	---
	d5-Nitrobenzene	1996.	1501.	75.2	20-140
	2-Fluorobiphenyl	2004.	1687.	84.2	20-140
	2,4,6-Tribromophenol	4000.	3890.	97.3	10-114
	d14-p-Terphenyl	2000.	2072.	104.	20-150
2	2-Fluorophenol	4004.	4082.	102.	24-133
	2-Fluoroaniline	2008.	228.	11.4	---
	d5-Phenol	4000.	4088.	102.	20-122
	2-Bromophenol	4000.	4048.	101.	---
	d5-Nitrobenzene	1996.	1936.	97.0	20-140
	2-Fluorobiphenyl	2004.	2220.	111.	20-140
	2,4,6-Tribromophenol	4000.	4008.	100.	10-114
	d14-p-Terphenyl	2000.	1502.	75.1	20-150
3	2-Fluorophenol	4004.	2778.	69.4	24-133
	2-Fluoroaniline	2008.	368.	18.3	---
	d5-Phenol	4000.	2560.	64.0	20-122
	2-Bromophenol	4000.	2542.	63.6	---
	d5-Nitrobenzene	1996.	1278.	64.0	20-140
	2-Fluorobiphenyl	2004.	1694.	84.5	20-140
	2,4,6-Tribromophenol	4000.	3028.	75.7	10-114
	d14-p-Terphenyl	2000.	1134.	56.7	20-150
4	2-Fluorophenol	4004.	2923.	73.0	24-133
	2-Fluoroaniline	2008.	322.	16.0	---
	d5-Phenol	4000.	2680.	67.0	20-122
	2-Bromophenol	4000.	2580.	64.5	---
	d5-Nitrobenzene	1996.	1337.	67.0	20-140
	2-Fluorobiphenyl	2004.	1705.	85.1	20-140
	2,4,6-Tribromophenol	4000.	3368.	84.2	10-114
	d14-p-Terphenyl	2000.	1270.	63.5	20-150



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parts per billion (ug/kg)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
5	2-Fluorophenol	4004.	3478.	86.9	24-133
	2-Fluoroaniline	2008.	540.	26.9	---
	d5-Phenol	4000.	3548.	88.7	20-122
	2-Bromophenol	4000.	3428.	85.7	---
	d5-Nitrobenzene	1996.	1528.	76.6	20-140
	2-Fluorobiphenyl	2004.	1896.	94.6	20-140
	2,4,6-Tribromophenol	4000.	3206.	80.2	10-114
	d14-p-Terphenyl	2000.	2034.	102.	20-150
6	2-Fluorophenol	4004.	3203.	80.0	24-133
	2-Fluoroaniline	2008.	273.	13.6	---
	d5-Phenol	4000.	3140.	78.5	20-122
	2-Bromophenol	4000.	3000.	75.0	---
	d5-Nitrobenzene	1996.	1609.	80.6	20-140
	2-Fluorobiphenyl	2004.	1862.	92.9	20-140
	2,4,6-Tribromophenol	4000.	3180.	79.5	10-114
	d14-p-Terphenyl	2000.	1590.	79.5	20-150
7	2-Fluorophenol	4004.	3312.	82.7	24-133
	2-Fluoroaniline	2008.	258.	12.8	---
	d5-Phenol	4000.	3306.	82.7	20-122
	2-Bromophenol	4000.	3132.	78.2	---
	d5-Nitrobenzene	1996.	1530.	76.7	20-140
	2-Fluorobiphenyl	2004.	1894.	94.5	20-140
	2,4,6-Tribromophenol	4000.	3402.	85.1	10-114
	d14-p-Terphenyl	2000.	1532.	76.6	20-150
8	2-Fluorophenol	4004.	5054.	126.	24-133
	2-Fluoroaniline	2008.	500.	24.9	---
	d5-Phenol	4000.	4894.	122.	20-122
	2-Bromophenol	4000.	4744.	119.	---
	d5-Nitrobenzene	1996.	2360.	118.	20-140
	2-Fluorobiphenyl	2004.	2828.	141.	20-140
	2,4,6-Tribromophenol	4000.	5290.	132.	10-114
	d14-p-Terphenyl	2000.	2064.	103.	20-150



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parts per billion (ug/kg)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
6 MS	2-Fluorophenol	4004.	4040.	101.	24-133
	2-Fluoroaniline	2008.	582.	29.0	---
	d5-Phenol	4000.	4030.	101.	20-122
	2-Bromophenol	4000.	3928.	98.2	---
	d5-Nitrobenzene	1996.	1814.	90.9	20-140
	2-Fluorobiphenyl	2004.	2240.	112.	20-140
	2,4,6-Tribromophenol	4000.	4132.	103.	10-114
	d14-p-Terphenyl	2000.	2500.	125.	20-150
Method Blank	2-Fluorophenol	4004.	3686.	92.1	24-133
	2-Fluoroaniline	2008.	1268.	63.1	---
	d5-Phenol	4000.	3842.	96.1	20-122
	2-Bromophenol	4000.	3485.	87.1	---
	d5-Nitrobenzene	1996.	1744.	87.4	20-140
	2-Fluorobiphenyl	2004.	1785.	89.1	20-140
	2,4,6-Tribromophenol	4000.	4149.	104.	10-114
	d14-p-Terphenyl	2000.	1482.	74.1	20-150

parts per billion (ug/L)

9	2-Fluorophenol	102.1	48.2	47.2	23-121
	2-Fluoroaniline	51.2	20.0	39.0	---
	d5-Phenol	102.0	42.1	41.2	15-103
	2-Bromophenol	102.0	48.3	47.4	---
	d5-Nitrobenzene	50.9	21.0	41.2	41-120
	2-Fluorobiphenyl	51.1	23.4	45.9	44-119
	2,4,6-Tribromophenol	102.0	81.5	79.9	10-130
	d14-p-Terphenyl	51.0	22.6	44.4	33-128



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parts per billion (ug/L)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
10	2-Fluorophenol	102.1	57.2	56.0	23-121
	2-Fluoroaniline	51.2	37.4	73.0	---
	d5-Phenol	102.0	61.8	60.6	15-103
	2-Bromophenol	102.0	74.6	73.2	---
	d5-Nitrobenzene	50.9	39.0	76.5	41-120
	2-Fluorobiphenyl	51.1	43.2	84.5	44-119
	2,4,6-Tribromophenol	102.0	87.3	85.6	10-130
	d14-p-Terphenyl	51.0	36.3	71.7	33-128
11	2-Fluorophenol	133.5	74.0	55.5	23-121
	2-Fluoroaniline	66.9	40.3	60.3	---
	d5-Phenol	133.3	65.7	49.3	15-103
	2-Bromophenol	133.3	90.2	67.6	---
	d5-Nitrobenzene	66.5	50.2	75.4	41-120
	2-Fluorobiphenyl	66.8	57.0	85.3	44-119
	2,4,6-Tribromophenol	133.3	116.5	87.4	10-130
	d14-p-Terphenyl	66.7	50.4	75.6	33-128
12	2-Fluorophenol	102.1	0.	0.	23-121
	2-Fluoroaniline	51.2	33.5	65.4	---
	d5-Phenol	102.0	0.	0.	15-103
	2-Bromophenol	102.0	0.	0.	---
	d5-Nitrobenzene	50.9	33.1	65.0	41-120
	2-Fluorobiphenyl	51.1	39.3	76.9	44-119
	2,4,6-Tribromophenol	102.0	69.7	68.3	10-130
	d14-p-Terphenyl	51.0	32.2	63.2	33-128
13	2-Fluorophenol	103.2	44.6	43.3	23-121
	2-Fluoroaniline	51.8	30.1	58.1	---
	d5-Phenol	103.1	36.6	35.5	15-103
	2-Bromophenol	103.1	53.1	51.5	---
	d5-Nitrobenzene	51.4	30.3	59.0	41-120
	2-Fluorobiphenyl	51.6	37.2	72.0	44-119
	2,4,6-Tribromophenol	103.1	65.4	63.4	10-130
	d14-p-Terphenyl	51.5	32.4	62.9	33-128



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parts per billion (ug/L)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
11 MS	2-Fluorophenol	133.5	61.0	45.7	23-121
	2-Fluoroaniline	66.9	44.2	66.1	---
	d5-Phenol	133.3	56.1	42.1	15-103
	2-Bromophenol	133.3	78.1	58.6	---
	d5-Nitrobenzene	66.5	47.4	71.3	41-120
	2-Fluorobiphenyl	66.8	55.9	83.7	44-119
	2,4,6-Tribromophenol	133.3	122.3	91.7	10-130
	d14-p-Terphenyl	66.7	41.5	62.2	33-128
Method Blank	2-Fluorophenol	100.1	39.1	39.0	23-121
	2-Fluoroaniline	50.2	0.	0.	---
	d5-Phenol	100.0	26.8	26.8	15-103
	2-Bromophenol	100.0	49.3	49.3	---
	d5-Nitrobenzene	49.9	0.	0.	41-120
	2-Fluorobiphenyl	50.1	0.	0.	44-119
	2,4,6-Tribromophenol	100.0	74.9	74.9	10-130
	d14-p-Terphenyl	50.0	34.3	68.6	33-128
9	dibutylchloredate	0.667	0.550	82.5	48-136
10	dibutylchloredate	0.667	0.594	89.1	48-136
11	dibutylchloredate	0.667	0.900	135.	48-136
12	dibutylchloredate	0.667	0.550	82.5	48-136
13	dibutylchloredate	0.667	0.614	92.0	48-136
Blank	dibutylchloredate	0.667	0.556	83.3	48-136
11 MS	dibutylchloredate	0.667	1.30	195.	48-136

parts per billion (ug/kg)

1	dibutylchloredate	20.0	23.0	115.	20-150
2	dibutylchloredate	20.0	24.6	123.	20-150
3	dibutylchloredate	20.0	23.8	119.	20-150
4	dibutylchloredate	20.0	32.4	162.	20-150
5	dibutylchloredate	20.0	18.5	57.1	20-150
6	dibutylchloredate	20.0	5.34	26.7	20-150



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parts per billion (ug/kg)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
7	dibutylchlorendate	20.0	23.8	119.	20-150
8	dibutylchlorendate	20.0	11.4	57.1	20-150
Blank	dibutylchlorendate	20.0	22.6	113.	20-150
6 MS	dibutylchlorendate	20.0	101.	506.	20-150

parts per million (mg/L)

1	Isodrin	0.00040	0.000656	164.	43-118*
2	Isodrin	0.00040	0.000332	90.8	43-118
3	Isodrin	0.00040	0.000480	120.	43-118*
4	Isodrin	0.00040	0.000399	99.8	43-118
5	Isodrin	0.00040	0.000468	117.	43-118
6	Isodrin	0.00040	0.000342	85.5	43-118
7	Isodrin	0.00040	0.000452	113.	43-118
8	Isodrin	0.00040	0.000380	69.9	43-118
Blank	Isodrin	0.00040	0.000367	91.8	43-118
MS	Isodrin	0.00040	0.000432	108.	43-118
1	2,4,5-T	0.0100	0.00965	96.5	28-128
2	2,4,5-T	0.0100	0.00941	94.1	28-128
3	2,4,5-T	0.0100	0.0112	112.	28-128
4	2,4,5-T	0.0100	0.00996	99.6	28-128
5	2,4,5-T	0.0100	0.0104	104.	28-128
6	2,4,5-T	0.0100	0.0116	116.	28-128
7	2,4,5-T	0.0100	0.0119	119.	28-128
8	2,4,5-T	0.0100	0.0134	134.	28-128*
Blank	2,4,5-T	0.0100	0.00807	80.7	28-128
8 MS	2,4,5-T	0.0100	0.0125	125.	28-128*
8 MSD	2,4,5-T	0.0100	0.0113	113.	28-128

* Matrix effect



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APPENDIX E

Matrix Spike/Matrix Spike Duplicate Analysis - Soils

Reported below are the results of additional QC compounds utilized in the analysis of organic compounds. Compounds of interest are spiked into two additional sample aliquots prior to extraction and/or analysis to monitor for matrix effects, sample processing errors, and to calculate percent recoveries of compounds of interest and relative error in the analysis. The control limits represent the 95% confidence interval established in the laboratory through repetitive analysis of these sample types.

Compound	parts per billion (ug/kg)					
	Conc Spike	Conc Samp	Conc MS	% REC	RPD Limit	REC Limit
1,1-Dichloroethene	25.	0.	20.3	81.2	22	59-172
Trichloroethene	25.	0.	21.6	86.4	24	62-137
Chlorobenzene	25.	0.	24.1	96.4	21	60-133
Toluene	25.	0.	27.2	109.	21	59-139
Benzene	25.	0.	23.3	93.2	21	66-142
1,2,4-Trichlorobenzene	50.0	0.	45.0	90.0	23	38-107
Acenaphthene	50.0	0.	62.6	125.	19	31-137
2,4-Dinitrotoluene	50.0	0.	44.4	88.8	47	28-89
Di-n-Butylphthalate	50.0	0.	57.9	116.	7	29-135
Pyrene	50.0	105.5	176.	141.	36	35-142
N-Nitrosodipropylamine	50.0	0.	63.8	128.	38	41-126
1,4-Dichlorobenzene	50.0	0.	52.8	106.	27	28-104
Pentachlorophenol	100.	0.	74.7	74.7	47	17-109
Phenol	100.	0.	106.5	106.	35	26-90
2-Chlorophenol	100.	0.	102.4	102.	50	25-102
P-Chloro-m-cresol	100.	0.	93.4	93.4	33	26-103
4-Nitrophenol	100.	0.	95.0	95.0	50	11-114



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Matrix Spike/Matrix Spike Duplicate Analysis - Waters

parts per billion (ug/L)

<u>Compound</u>	<u>Conc Spike</u>	<u>Conc Samp</u>	<u>Conc MS</u>	<u>% REC</u>	<u>RPD Limit</u>	<u>REC Limit</u>
1,1-Dichloroethene	25.	0.	16.7	66.8	14	61-145
Trichloroethene	25.	0.	18.8	75.2	14	71-120
Chlorobenzene	25.	0.	20.3	81.2	13	75-130
Toluene	25.	0.	22.0	88.0	13	76-125
Benzene	25.	0.	19.7	78.8	11	76-127
1,2,4-Trichlorobenzene	50.0	0.	30.7	61.4	28	39-98
Acenaphthene	50.0	0.	47.7	95.4	31	46-116
2,4-Dinitrotoluene	50.0	0.	38.0	76.0	38	24-96
Di-n-Butylphthalate	50.0	0.	41.1	82.2	40	11-117
Pyrene	50.0	0.	24.3	48.6	31	26-127
N-Nitrosodipropylamine	50.0	0.	44.7	89.4	38	41-116
1,4-Dichlorobenzene	50.0	0.	32.2	64.4	28	36-97
Pentachlorophenol	100.	0.	81.0	81.0	50	9-103
Phenol	100.	0.	44.0	44.0	42	12-89
2-Chlorophenol	100.	0.	57.8	57.8	40	27-123
P-Chloro-m-cresol	100.	0.	63.7	63.7	42	23-97
4-Nitrophenol	100.	0.	37.1	37.1	50	10-80

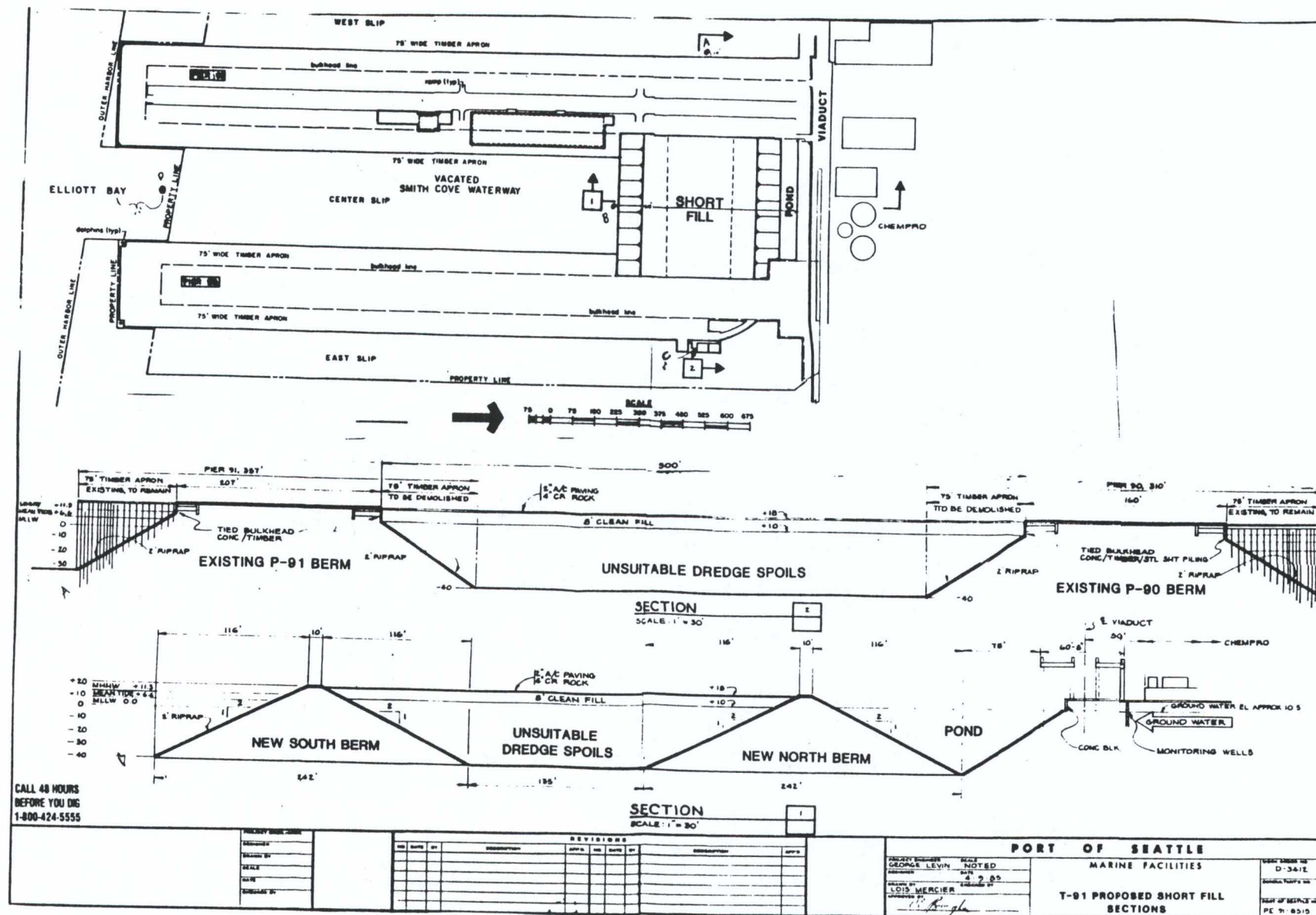
Key

Conc = Concentration
Samp = Sample
MS = Matrix Spike

RPD = Relative Percent Difference
REC = Recovery



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CLIENT Port of Seattle
P.O. Box 1209
Seattle, WA 98111
ATTN: Doug Hotchkiss

LABORATORY NO. 85194

DATE Aug. 6, 1984

REPORT ON SOIL

SAMPLE IDENTIFICATION

Samples were submitted and assigned sequential sample numbers. At your request, only the samples identified below were analyzed:

		Boxing Sample				Criteria		Disposal Method	
TESTS PERFORMED	AND RESULTS:								
		12	A	7	J-1404 HCE-12 S-1 0-3.6' 0-3' (2) 6-27	Fail		Contained	
		6	A	15	J-1404 HCE-6 S-1 1.1-4.1' 1.1-4.1' (2) 6-20	"		"	
		6	B	16	J-1404 HCE-6 S-2 7.3-10.3' 4.1-7.1' (2) 6-20	"		"	
		8	A	22	J-1404 HCE-8 S-1 0-3.4' 0-3' 6-22	"		"	
		8	B	23	J-1404 HCE-8 S-2 4.5-6.5' 4.7-6.7' 6-22	"		"	
		10	B	28	J-1404 HCE-10 S-2 3.5-7.5' 4.5-7.5' 6-22	"		"	
		10	B	29	J-1404 HCE-10 S-3 8.5-10.5' 8.7-10.7' 6-22	"		"	
		13	B	36	J-1404 HCE-12 S-2 5.5-9.0' 5.5-9.0' 6-27	Pass		Open	
		14	B	42	J-1404 HCE-14 S-4 6.8-8.8 6-27	Fail		Contained	

Samples were passed through a No. 10 sieve prior to analysis. Only material passing the sieve was analyzed. Percentages retained were as follows:

	12-A	6-A	6-B	8-A	8-B
	7	15	16	22	23
% retained	6	3	6	L/2	6
Major description	wood	wood	wood	—	shells
Minor description	shells, rocks	shells, rocks	shells, rocks, foil	—	—
	10-B	10-B	12-B	14-B	
	28	29	36	42	
% retained	6	L/2	L/2	L/2	
Major description	shells	—	—	—	
Minor description	wood	—	—	—	



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Routine analyses were then performed on the samples, with results as follow:

%, as received basis

	<u>7</u>	<u>15</u>	<u>16</u>	<u>22</u>	<u>23</u>
Total Solids	52.0	45.5	54.8	52.9	50.0

	<u>28</u>	<u>29</u>	<u>36</u>	<u>42</u>
Total Solids	52.8	75.2	74.9	68.2

%, dry basis

	<u>7</u>	<u>15</u>	<u>16</u>	<u>22</u>	<u>23</u>
Total Organic Carbon	3.3	5.2	3.4	2.2	3.0
Total Volatile Solids	9.2	11.4	7.2	6.7	9.1
Oil & Grease	1.1	1.8	1.0	0.47	0.90
Sulfide as S	.030	.046	.076	.063	.043
Sand	22.7	7.6	42.8	28.8	16.9
Silt	55.3	65.0	42.1	52.8	55.6
Clay	22.0	27.4	15.1	18.4	27.5

	<u>28</u>	<u>29</u>	<u>36</u>	<u>42</u>
Total Organic Carbon	2.5	0.9	0.1	2.0
Total Volatile Solids	6.9	3.3	1.2	6.2
Oil & Grease	0.50	0.17	L/0.01	0.21
Sulfide as S	.007	.003	.004	.005
Sand	22.6	81.6	88.4	51.0
Silt	53.6	13.5	9.8	36.9
Clay	23.8	4.9	1.8	12.1



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Samples were then analyzed for Halogenated Hydrocarbons in accordance with Washington State Department of Ecology WAC 173-303 with results as follow:

	<u>7</u>	<u>15</u>	<u>16</u>	<u>22</u>	<u>23</u>
Halogenated Hydrocarbons* parts per million (mg/kg), as received basis	L/15.	L/15.	L/15.	L/15.	L/15.

	<u>28</u>	<u>29</u>	<u>36</u>	<u>42</u>	<u>MCL</u>
Halogenated Hydrocarbons* parts per million (mg/kg), as received basis	L/15.	L/15.	L/15.	L/15.	*

* reported as the sum of the halogens bromide, chloride, fluoride and iodide.
A result of less than 100 parts per million is classified as undesignated waste.

Samples were analyzed in accordance with 40 CFR, Part 261.24 for EP Toxicity, with results as shown below:

	<u>concentration, mg/L</u>				
	<u>7</u>	<u>15</u>	<u>16</u>	<u>22</u>	<u>23</u>
Arsenic	L/0.1	L/0.1	L/0.1	L/0.1	L/0.1
Barium	L/0.5	L/0.5	L/0.5	L/0.5	L/0.5
Cadmium	L/0.02	L/0.02	L/0.02	L/0.02	L/0.02
Chromium	L/0.1	L/0.1	L/0.1	L/0.1	L/0.1
Lead	L/0.2	L/0.2	L/0.2	L/0.2	L/0.2



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	<u>concentration, mg/L</u>				
	<u>7</u>	<u>15</u>	<u>16</u>	<u>22</u>	<u>23</u>
Mercury	L/0.005	L/0.005	L/0.005	L/0.005	L/0.005
Selenium	L/0.1	L/0.1	L/0.1	L/0.1	L/0.1
Silver	L/0.1	L/0.1	L/0.1	L/0.1	L/0.1
Endrin	L/0.0002	L/0.0002	L/0.0002	L/0.0002	L/0.0002
Methoxychlor	L/0.001	L/0.001	L/0.001	L/0.001	L/0.001
Toxaphene	L/0.005	L/0.005	L/0.005	L/0.005	L/0.005
2,4-D	L/0.005	L/0.005	L/0.005	L/0.005	L/0.005
2,4,5-TP (silvex)	L/0.002	L/0.002	L/0.002	L/0.002	L/0.002
Lindane	L/0.0001	L/0.0001	L/0.0001	L/0.0001	L/0.0001

	<u>concentration, mg/L</u>				
	<u>28</u>	<u>29</u>	<u>36</u>	<u>42</u>	<u>MCL</u>
Arsenic	L/0.1	L/0.1	L/0.1	L/0.1	5.0
Barium	L/0.5	L/0.5	L/0.5	L/0.5	100.
Cadmium	L/0.02	L/0.02	L/0.02	L/0.02	1.0
Chromium	L/0.1	L/0.1	L/0.1	L/0.1	5.0
Lead	L/0.2	L/0.2	L/0.2	L/0.2	5.0
Mercury	L/0.005	L/0.005	L/0.005	L/0.005	0.2
Selenium	L/0.01	L/0.01	L/0.01	L/0.01	1.0
Silver	L/0.1	L/0.1	L/0.1	L/0.1	5.0
Endrin	L/0.0002	L/0.0002	L/0.0002	L/0.0002	0.02
Methoxychlor	L/0.001	L/0.001	L/0.001	L/0.001	10.0
Toxaphene	L/0.005	L/0.005	L/0.005	L/0.005	0.5
2,4-D	L/0.005	L/0.005	L/0.005	L/0.005	10.0
2,4,5-TP (silvex)	L/0.002	L/0.002	L/0.002	L/0.002	1.0
Lindane	L/0.0001	L/0.0001	L/0.0001	L/0.0001	0.4



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Samples were analyzed also for Gravimetric Aromatic Hydrocarbons in accordance with Washington State Department of Ecology WAC 173-303. The method requires analysis of the sample through successive stages until the result obtained is less than 1% by weight (as received basis) or until the fourth stage has been completed. Results are as shown below:

	<u>% by weight, as received basis*</u>				
<u>Stage:</u>	<u>7</u>	<u>15</u>	<u>16</u>	<u>22</u>	<u>23</u>
1. Soxhlet Extraction	.22	.28	.32	.22	.084
	<u>28</u>	<u>29</u>	<u>36</u>	<u>42</u>	
1. Soxhlet Extraction	.052	.082	.015	.19	

* for 4,5,6 membered rings

Samples were analyzed for priority pollutants in accordance with 40 CFR, Part 261, with results as shown below:

	<u>parts per million (mg/kg), dry basis</u>				
<u>Inorganics</u>	<u>7</u>	<u>15</u>	<u>16</u>	<u>22</u>	<u>23</u>
Antimony	L/0.5	L/0.5	L/0.5	L/0.5	L/0.5
Arsenic	21.	19.	15.	15.	20.
Beryllium	0.32	0.32	0.19	0.23	0.31
Cadmium	5.8	10.	6.1	2.2	3.5
Chromium	89.	300.	100.	44.	100.
Copper	110.	190.	91.	74.	130.
Lead	160.	350.	100.	110.	220.
Mercury	1.4	1.6	1.0	.39	1.1



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parts per million (mg/kg), dry basis

	<u>7</u>	<u>15</u>	<u>16</u>	<u>22</u>	<u>23</u>
Nickel	50.	58.	46.	40.	57.
Selenium	0.6	L/0.5	0.5	L/0.5	0.8
Silver	2.0	3.7	1.6	0.6	3.2
Thallium	L/0.5	L/0.5	L/0.5	L/0.5	L/0.5
Zinc	420.	550.	320.	240.	360.
Total Cyanide	5.6	1.3	0.6	L/0.5	0.7
Total Phenol	L/0.1	L/0.1	L/0.1	L/0.1	L/0.1

Volatile Organics (by GC/MS)

parts per billion (ug/kg), dry basis

Chloromethane	L/4.	L/4.	L/4.	L/4.	L/4.
Bromomethane	L/4.	L/4.	L/4.	L/4.	L/4.
Vinyl Chloride	L/4.	L/4.	L/4.	L/4.	L/4.
Chloroethane	L/4.	L/4.	L/4.	L/4.	L/4.
Methylene Chloride	240.	160.	180.	780.	290.
Acrolein	L/4.	L/4.	L/4.	L/4.	L/4.
*Acetone	1,100.	660.	L/20.	L/20.	L/20.
Acrylonitrile	L/4.	L/4.	L/4.	L/4.	L/4.
*Carbon Disulfide	L/4.	L/4.	L/4.	L/4.	L/4.
1,1-Dichloroethylene	L/4.	L/4.	L/4.	L/4.	L/4.
1,1-Dichloroethane	L/4.	L/4.	L/4.	L/4.	L/4.
trans-1,2-Dichloroethylene	L/4.	L/4.	L/4.	L/4.	L/4.
Chloroform	L/4.	L/4.	L/4.	L/4.	L/4.
*2-Butanone	L/4.	L/4.	L/4.	L/4.	L/4.
1,2-Dichloroethane	L/4.	L/4.	L/4.	L/4.	L/4.
1,1,1-Trichloroethane	L/4.	L/4.	L/4.	L/4.	L/4.
*Vinyl Acetate	L/4.	L/4.	L/4.	L/4.	L/4.
Bromodichloromethane	L/4.	L/4.	L/4.	L/4.	L/4.
Carbon Tetrachloride	L/4.	L/4.	L/4.	L/4.	L/4.
1,2-Dichloropropane	L/4.	L/4.	L/4.	L/4.	L/4.
Trichloroethylene	L/4.	L/4.	L/4.	L/4.	L/4.
Benzene	L/4.	L/4.	L/4.	L/4.	L/4.



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parts per billion (ug/kg), dry basis

	<u>7</u>	<u>15</u>	<u>16</u>	<u>22</u>	<u>23</u>
Chlorodibromomethane	L/4.	L/4.	L/4.	L/4.	L/4.
1,1,2-Trichloroethane	L/4.	L/4.	L/4.	L/4.	L/4.
2-Chloroethyl vinyl ether	L/4.	L/4.	L/4.	L/4.	L/4.
Bromoform	L/4.	L/4.	L/4.	L/4.	L/4.
*4-Methyl-2-pentanone	L/4.	L/4.	L/4.	L/4.	L/4.
*2-Hexanone	L/4.	L/4.	L/4.	L/4.	L/4.
1,1,2,2-Tetrachloroethane	L/4.	L/4.	10.	L/4.	L/4.
Tetrachloroethylene	L/4.	L/4.	L/4.	L/4.	L/4.
Toluene	20.	20.	50.	L/4.	50.
Chlorobenzene	L/4.	L/4.	L/4.	L/4.	L/4.
trans-1,3-Dichloropropene	L/4.	L/4.	L/4.	L/4.	L/4.
Ethylbenzene	60.	90.	10.	L/4.	L/4.
cis-1,3-Dichloropropene	L/4.	L/4.	L/4.	L/4.	L/4.
*Styrene	L/4.	L/4.	L/4.	L/4.	L/4.
*o-Xylene + p-Xylene	L/4.	L/4.	20.	L/4.	L/4.
**Fluorotrichloromethane	L/4.	L/4.	100.	L/4.	30.

Extractables (by GC/MS)

N-nitrosodimethylamine	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroethyl)ether	L/100.	L/100.	L/100.	L/100.	L/100.
2-Chlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
Phenol	L/100.	L/100.	L/100.	L/100.	L/100.
1,3-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
1,4-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
1,2-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroisopropyl)ether	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachloroethane	L/100.	L/100.	L/100.	L/100.	L/100.
N-nitroso-di-n-propylamine	L/100.	L/100.	L/100.	L/100.	L/100.
Nitrobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Isophorone	L/100.	L/100.	L/100.	L/100.	L/100.



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parts per billion (ug/kg), dry basis

	<u>7</u>	<u>15</u>	<u>16</u>	<u>22</u>	<u>23</u>
2-Nitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dimethylphenol	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroethoxy)methane	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
1,2,4-Trichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Naphthalene	L/100.	L/100.	3,800.	630.	L/100.
Hexachlorobutadiene	L/100.	L/100.	L/100.	L/100.	L/100.
4-Chloro-m-cresol	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachlorocyclopentadiene	L/100.	L/100.	L/100.	L/100.	L/100.
2,4,6-Trichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
2-Chloronaphthalene	L/100.	L/100.	L/100.	L/100.	L/100.
Acenaphthylene	L/100.	L/100.	L/100.	L/100.	L/100.
Dimethylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.
2,6-Dinitrotoluene	L/100.	L/100.	L/100.	L/100.	L/100.
Acenaphthene	L/100.	L/100.	L/100.	2,040.	L/100.
2,4-Dinitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dinitrotoluene	L/100.	L/100.	L/100.	L/100.	L/100.
4-Nitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.
Fluorene	L/100.	L/100.	L/100.	L/100.	L/100.
4-Chlorophenyl phenyl ether	L/100.	L/100.	L/100.	L/100.	L/100.
Diethylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.
4,6-Dinitro-o-cresol	L/100.	L/100.	L/100.	L/100.	L/100.
1,2-Diphenylhydrazine	L/100.	L/100.	L/100.	L/100.	L/100.
4-Bromophenyl phenyl ether	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Pentachlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
Phenanthrene	8,400.	L/100.	L/100.	2,990.	L/100.
Anthracene	1,500.	L/100.	L/100.	1,350.	L/100.
Dibutylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.
Fluoranthene	15,100.	L/100.	L/100.	6,130.	L/100.
Pyrene	L/100.	L/100.	L/100.	4,440.	L/100.
Benzidine	L/100.	L/100.	L/100.	L/100.	L/100.



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parts per billion (ug/kg), dry basis

	<u>7</u>	<u>15</u>	<u>16</u>	<u>22</u>	<u>23</u>
Butyl benzyl phthalate	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(a)anthracene	L/100.	L/100.	L/100.	L/100.	L/100.
Chrysene	L/100.	L/100.	L/100.	L/100.	L/100.
3,3'-Dichlorobenzidine	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-ethylhexyl)phthalate	4,200.	3,600.	2,600.	2,100.	2,600.
N-nitrosodiphenylamine	L/100.	L/100.	L/100.	L/100.	L/100.
Di-n-octyl phthalate	L/100.	510.	L/100.	630.	L/100.
Benzo(b)fluoranthene	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(k)fluoranthene	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(a)pyrene	L/100.	L/100.	L/100.	L/100.	L/100.
Indeno(1,2,3-cd)pyrene	L/100.	L/100.	L/100.	L/100.	L/100.
Dibenzo(ah)anthracene	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(ghi)perylene	L/100.	L/100.	L/100.	L/100.	L/100.
2,3,7,8-Tetrachlorodibenzo- p-dioxin (TCDD)	L/100.	L/100.	L/100.	L/100.	L/100.
*Aniline	L/100.	L/100.	L/100.	L/100.	L/100.
*Benzoic Acid	L/100.	L/100.	L/100.	L/100.	L/100.
*Benzyl Alcohol	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Chloroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*Dibenzofuran	L/100.	L/100.	L/100.	1,530.	L/100.
*2-Methylnaphthalene	L/100.	L/100.	L/100.	L/100.	L/100.
*2-Methylphenol	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Methylphenol	L/100.	L/100.	L/100.	L/100.	L/100.
*2-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*3-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*2,4,5-Trichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.



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Pesticides (by GC/ECD)

	<u>7</u>	<u>15</u>	<u>16</u>	<u>22</u>	<u>23</u>
alpha-BHC	L/5.	L/5.	L/5.	L/5.	L/5.
beta-BHC	L/5.	L/5.	L/5.	L/5.	L/5.
delta-BHC	L/5.	L/5.	L/5.	L/5.	L/5.
gamma-BHC (lindane)	L/5.	L/5.	L/5.	L/5.	L/5.
heptachlor	L/5.	L/5.	L/5.	L/5.	10.
aldrin	L/5.	L/5.	L/5.	L/5.	L/5.
heptachlor epoxide	L/5.	L/5.	L/5.	L/5.	L/5.
dieldrin	L/5.	L/5.	L/5.	L/5.	L/5.
4,4°-DDE	L/5.	L/5.	L/5.	L/5.	L/5.
4,4°-DDD	120.	170.	80.	L/10.	50.
endosulfan sulfate	L/10.	40.	L/10.	L/10.	40.
4,4°-DDT	40.	L/10.	15.	L/10.	30.
chlordane	L/10.	L/10.	L/10.	L/10.	L/10.
alpha endosulfan	L/10.	L/10.	L/10.	L/10.	L/10.
beta endosulfan	L/10.	L/10.	L/10.	L/10.	L/10.
endrin	L/10.	L/10.	L/10.	L/10.	L/10.
endrin aldehyde	L/10.	L/10.	L/10.	L/10.	L/10.
toxaphene	L/400.	L/400.	L/400.	L/400.	L/400.
PCB 1016.	L/100.	L/100.	L/100.	L/100.	L/100.
PCB 1221	L/100.	L/100.	L/100.	L/100.	L/100.
PCB 1232	L/100.	L/100.	L/100.	L/100.	L/100.
PCB 1242	1,100.	970.	580.	L/100.	540.
PCB 1248	L/100.	L/100.	L/100.	L/100.	L/100.
PCB 1254	L/100.	L/100.	L/100.	L/100.	L/100.
PCB 1260	4,100.	5,640.	1,600.	1,200.	3,200.



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parts per million (mg/kg), dry basis

Inorganics

	<u>28</u>	<u>29</u>	<u>36</u>	<u>42</u>
Antimony	L/0.5	L/0.5	L/0.5	L/0.5
Arsenic	16.	5.1	2.2	10.
Beryllium	0.24	0.13	0.07	0.14
Cadmium	2.2	0.7	0.4	1.5
Chromium	50.	17.	18.	30.
Copper	98.	34.	10.	47.
Lead	150.	66.	2.7	62.
Mercury	0.89	0.22	L/0.05	0.66
Nickel	44.	17.	2.5	30.
Selenium	0.5	L/0.5	L/0.5	L/0.5
Silver	1.6	0.5	L/0.2	0.5
Thallium	L/0.5	L/0.5	L/0.5	L/0.5
Zinc	250.	92.	36.	150.
Total Cyanide	0.6	L/0.5	L/0.5	L/0.5
Total Phenol	L/0.1	L/0.1	L/0.1	L/0.1

Volatile Organics (by GC/MS)

parts per billion (ug/kg), dry basis

	<u>28</u>	<u>29</u>	<u>36</u>	<u>42</u>	<u>43</u>
Chloromethane	L/4.	L/3.	L/3.	L/3.	L/1.
Bromomethane	L/4.	L/3.	L/3.	L/3.	L/1.
Vinyl Chloride	L/4.	L/3.	L/3.	L/3.	L/1.
Chloroethane	L/4.	L/3.	L/3.	L/3.	L/1.
Methylene Chloride	150.	230.	140.	340.	L/1.
Acrolein	L/4.	L/3.	L/3.	L/3.	L/1.
*Acetone	L/20.	L/10.	320.	220.	L/1.
Acrylonitrile	L/4.	L/3.	L/3.	L/3.	L/1.
*Carbon Disulfide	L/4.	L/3.	L/3.	L/3.	L/1.
1,1-Dichloroethylene	L/4.	L/3.	L/3.	L/3.	L/1.
1,1-Dichloroethane	L/4.	L/3.	L/3.	L/3.	L/1.
trans-1,2-Dichloroethylene	L/4.	L/3.	L/3.	L/3.	L/1.
Chloroform	L/4.	L/3.	L/3.	L/3.	L/1.



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parts per billion (ug/kg), dry basis

	<u>28</u>	<u>29</u>	<u>36</u>	<u>42</u>	<u>Method Blank</u>
*2-Butanone	L/4.	L/3.	L/3.	L/3.	L/1.
1,2-Dichloroethane	L/4.	L/3.	L/3.	L/3.	L/1.
1,1,1-Trichloroethane	L/4.	L/3.	L/3.	L/3.	L/1.
*Vinyl Acetate	L/4.	L/3.	L/3.	L/3.	L/1.
Bromodichloromethane	L/4.	L/3.	L/3.	L/3.	L/1.
Carbon Tetrachloride	L/4.	L/3.	L/3.	L/3.	L/1.
1,2-Dichloropropane	L/4.	L/3.	L/3.	L/3.	L/1.
Trichloroethylene	L/4.	L/3.	L/3.	L/3.	L/1.
Benzene	L/4.	L/3.	L/3.	L/3.	L/1.
Chlorodibromomethane	L/4.	L/3.	L/3.	L/3.	L/2.
1,1,2-Trichloroethane	L/4.	L/3.	L/3.	L/3.	L/1.
2-Chloroethyl vinyl ether	L/4.	L/3.	L/3.	L/3.	L/1.
Bromoform	L/4.	L/3.	L/3.	L/3.	L/1.
*4-Methyl-2-pentanone	L/4.	L/3.	L/3.	L/3.	L/1.
*2-Hexanone	L/4.	L/3.	L/3.	L/3.	L/1.
1,1,2,2-Tetrachloroethane	L/4.	L/3.	L/3.	L/3.	L/1.
Tetrachloroethylene	L/4.	L/3.	L/3.	L/3.	L/1.
Toluene	10.	5.	3.	5.	L/1.
Chlorobenzene	L/4.	L/3.	L/3.	L/3.	L/1.
trans-1,3-Dichloropropene	L/4.	L/3.	L/3.	L/3.	L/1.
Ethylbenzene	L/4.	L/3.	L/3.	L/3.	L/1.
cis-1,3-Dichloropropene	L/4.	L/3.	L/3.	L/3.	L/1.
*Styrene	L/4.	L/3.	L/3.	L/3.	L/1.
*o-Xylene + p-Xylene	L/4.	L/3.	L/3.	L/3.	L/1.
**Fluorotrichloromethane	70.	30.	10.	40.	L/1.



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<u>Extractables (by GC/MS)</u>	<u>28</u>	<u>29</u>	<u>36</u>	<u>42</u>	<u>Method Blank</u>
N-nitrosodimethylamine	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroethyl)ether	L/100.	L/100.	L/100.	L/100.	L/100.
2-Chlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
Phenol	L/100.	L/100.	L/100.	L/100.	L/100.
1,3-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
1,4-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
1,2-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroisopropyl)ether	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachloroethane	L/100.	L/100.	L/100.	L/100.	L/100.
-nitroso-di-n-propylamine	L/100.	L/100.	L/100.	L/100.	L/100.
Nitrobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Isophorone	L/100.	L/100.	L/100.	L/100.	L/100.
2-Nitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dimethylphenol	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroethoxy)methane	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
1,2,4-Trichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Naphthalene	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachlorobutadiene	L/100.	L/100.	L/100.	L/100.	L/100.
4-Chloro-m-cresol	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachlorocyclopentadiene	L/100.	L/100.	L/100.	L/100.	L/100.
2,4,6-Trichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
2-Chloronaphthalene	L/100.	L/100.	L/100.	L/100.	L/100.
Acenaphthylene	L/100.	L/100.	L/100.	L/100.	L/100.
Dimethylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.
2,6-Dinitrotoluene	L/100.	L/100.	L/100.	L/100.	L/100.
Acenaphthene	1,370.	440.	L/100.	L/100.	L/100.
2,4-Dinitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dinitrotoluene	L/100.	L/100.	L/100.	L/100.	L/100.
4-Nitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.
Fluorene	L/100.	L/100.	L/100.	L/100.	L/100.
4-Chlorophenyl phenyl ether	L/100.	L/100.	L/100.	L/100.	L/100.



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	<u>28</u>	<u>29</u>	<u>36</u>	<u>42</u>	<u>Method Blank</u>
Diethylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.
4,6-Dinitro-o-cresol	L/100.	L/100.	L/100.	L/100.	L/100.
1,2-Diphenylhydrazine	L/100.	L/100.	L/100.	L/100.	L/100.
4-Bromophenyl phenyl ether	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.
Pentachlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.
Phenanthrene	3,690.	L/100.	L/100.	L/100.	L/100.
Anthracene	1,290.	L/100.	L/100.	L/100.	L/100.
Dibutylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.
Fluoranthene	9,200.	L/100.	L/100.	L/100.	L/100.
Pyrene	L/100.	L/100.	L/100.	3,670.	L/100.
Benzidine	L/100.	L/100.	L/100.	L/100.	L/100.
Butyl benzyl phthalate	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(a)anthracene	L/100.	L/100.	L/100.	L/100.	L/100.
Chrysene	L/100.	L/100.	L/100.	L/100.	L/100.
3,3°-Dichlorobenzidine	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-ethylhexyl)phthalate	1,800.	3,200.	1,390.	L/100.	L/100.
N-nitrosodiphenylamine	L/100.	L/100.	L/100.	L/100.	L/100.
Di-n-octyl phthalate	L/100.	L/100.	670.	L/100.	L/100.
Benzo(b)fluoranthene	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(k)fluoranthene	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(a)pyrene	L/100.	L/100.	L/100.	L/100.	L/100.
Indeno(1,2,3-cd)pyrene	L/100.	L/100.	L/100.	L/100.	L/100.
Dibenzo(ah)anthracene	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(ghi)perylene	L/100.	L/100.	L/100.	L/100.	L/100.
2,3,7,8-Tetrachlorodibenzo- p-dioxin (TCDD)	L/100.	L/100.	L/100.	L/100.	L/100.
*Aniline	L/100.	L/100.	L/100.	L/100.	L/100.
*Benzoic Acid	L/100.	L/100.	L/100.	L/100.	L/100.
*Benzyl Alcohol	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Chloroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*Dibenzofuran	L/100.	L/100.	L/100.	L/100.	L/100.



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	<u>28</u>	<u>29</u>	<u>36</u>	<u>42</u>	<u>Method Blank</u>
*2-Methylnaphthalene	L/100.	L/100.	L/100.	L/100.	L/100.
*2-Methylphenol	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Methylphenol	L/100.	L/100.	L/100.	L/100.	L/100.
*2-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*3-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.
*2,4,5-Trichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.

Pesticides (by GC/ECD)

alpha-BHC	L/5.	L/5.	L/5.	L/5.
beta-BHC	L/5.	L/5.	L/5.	L/5.
delta-BHC	L/5.	L/5.	L/5.	L/5.
gamma-BHC (lindane)	L/5.	L/5.	L/5.	L/5.
heptachlor	L/5.	L/5.	L/5.	L/5.
aldrin	L/5.	L/5.	L/5.	L/5.
heptachlor epoxide	L/5.	L/5.	L/5.	L/5.
dieldrin	L/5.	L/5.	L/5.	L/5.
4,4°-DDE	15.	L/5.	L/5.	L/5.
4,4°-DDD	90.	L/10.	L/10.	20.
endosulfan sulfate	L/10.	L/10.	L/10.	L/10.
4,4°-DDT	L/10.	L/10.	L/10.	L/10.
chlordane	L/10.	L/10.	L/10.	L/10.
alpha endosulfan	L/10.	L/10.	L/10.	L/10.
beta endosulfan	L/10.	L/10.	L/10.	L/10.
endrin	L/10.	L/10.	L/10.	L/10.
endrin aldehyde	L/10.	L/10.	L/10.	L/10.



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parts per billion (ug/kg), dry basis

	<u>28</u>	<u>29</u>	<u>36</u>	<u>42</u>
toxaphene	L/400.	L/400.	L/400.	L/400.
PCB 1016	L/100.	L/100.	L/100.	L/100.
PCB 1221	L/100.	L/100.	L/100.	L/100.
PCB 1232	L/100.	L/100.	L/100.	L/100.
PCB 1242	L/100.	L/100.	L/100.	L/100.
PCB 1248	L/100.	L/100.	L/100.	L/100.
PCB 1254	L/100.	L/100.	100.	L/100.
PCB 1260	3,100.	1,000.	L/100.	200.

Key

L/ indicates "less than"

MCL=Maximum Contamination Level allowed per regulation.

*Additional compounds from the EPA's Hazardous Substances List.

**Other compounds of interest identified, in estimated amounts.

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens

J. M. Owens

JMO:rtv



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APPENDIX A

Surrogate Recovery Quality Control Report

Listed below are surrogate (chemically similar) compounds utilized in the analysis of organic compounds. The surrogates are added to every sample prior to analysis and extraction to monitor for matrix effects, purging efficiency and sample processing errors. The control limits represent the 95% confidence interval established in our laboratory through repetitive analysis of these sample types.

Priority Pollutant Analyses:

parts per million (mg/kg)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
7	2-Fluorophenol	33.05	33.36	91.9	26-116
7	2-Fluoroaniline	34.09	17.42	51.1	*
7	d5-Phenol	32.28	18.04	55.9	10-104
7	d5-Nitrobenzene	35.89	29.39	81.9	19-115
7	2-Fluorobiphenyl	32.28	33.99	105.3	17-125
7	2,4,6-Tribromophenol	32.28	29.79	92.3	32-124
15	2-Fluorophenol	38.47	27.35	71.1	26-116
15	2-Fluoroaniline	39.67	5.91	14.9	*
15	d5-Phenol	37.57	17.73	47.2	10-104
15	d5-Nitrobenzene	41.77	32.08	76.8	19-115
15	2-Fluorobiphenyl	37.57	30.24	80.5	17-125
15	2,4,6-Tribromophenol	37.57	27.20	72.4	32-124
16	2-Fluorophenol	31.47	34.49	109.6	26-116
16	2-Fluoroaniline	32.45	23.59	72.7	*
16	d5-Phenol	30.73	29.10	94.7	10-104
16	d5-Nitrobenzene	34.17	31.71	92.8	19-115
16	2-Fluorobiphenyl	30.73	34.26	111.5	17-125
16	2,4,6-Tribromophenol	30.73	35.40	115.2	32-124



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parts per million (mg/kg)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
22	2-Fluorophenol	31.94	31.95	100.0	26-116
22	2-Fluoroaniline	32.94	21.56	65.5	*
22	d5-Phenol	31.19	26.66	85.5	10-104
22	d5-Nitrobenzene	34.68	33.86	97.7	19-115
22	2-Fluorobiphenyl	31.19	32.65	104.7	17-125
22	2,4,6-Tribromophenol	31.19	30.32	97.2	32-124
23	2-Fluorophenol	34.18	40.42	118.3	26-116
23	2-Fluoroaniline	35.25	20.07	56.9	*
23	d5-Phenol	33.38	33.42	100.1	10-104
23	d5-Nitrobenzene	37.12	38.01	102.4	19-115
23	2-Fluorobiphenyl	33.38	35.96	107.7	17-125
23	2,4,6-Tribromophenol	33.38	40.37	120.9	32-124
28	2-Fluorophenol	31.86	36.49	114.5	26-116
28	2-Fluoroaniline	32.86	21.16	64.4	*
28	d5-Phenol	31.11	27.83	89.5	10-104
28	d5-Nitrobenzene	34.60	34.23	98.9	19-115
28	2-Fluorobiphenyl	31.11	32.40	104.1	17-125
28	2,4,6-Tribromophenol	31.11	32.85	105.6	32-124
29	2-Fluorophenol	23.62	27.65	117.1	26-116
29	2-Fluoroaniline	24.35	7.86	32.3	*
29	d5-Phenol	23.06	16.88	73.2	10-104
29	d5-Nitrobenzene	25.65	21.17	82.5	19-115
29	2-Fluorobiphenyl	23.06	22.94	99.5	17-125
29	2,4,6-Tribromophenol	23.06	21.71	94.1	32-124
36	2-Fluorophenol	22.81	30.90	135.5	26-116
36	2-Fluoroaniline	23.52	18.66	79.3	*
36	d5-Phenol	22.27	19.75	88.7	10-104
36	d5-Nitrobenzene	24.77	26.26	106.0	19-115
36	2-Fluorobiphenyl	22.27	22.80	102.4	17-125
36	2,4,6-Tribromophenol	22.27	18.08	81.4	32-124



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parts per million (mg/kg)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
42	2-Fluorophenol	25.90	25.28	97.6	26-116
42	2-Fluoroaniline	26.71	14.96	56.0	*
42	d5-Phenol	24.29	17.23	68.1	10-104
42	d5-Nitrobenzene	28.12	31.91	113.5	19-115
42	2-Fluorobiphenyl	25.29	28.66	113.3	17-125
42	2,4,6-Tribromophenol	25.29	25.59	101.2	32-124
36 Spike	2-Fluorophenol	22.81	26.95	118.1	26-116
36 Spike	2-Fluoroaniline	23.52	12.48	53.1	*
36 Spike	d5-Phenol	22.27	19.66	88.3	10-104
36 Spike	d5-Nitrobenzene	24.77	23.68	95.6	19-115
36 Spike	2-Fluorobiphenyl	22.27	21.79	97.9	17-125
36 Spike	2,4,6-Tribromophenol	22.27	18.41	82.7	32-124
36 Dup.	2-Fluorophenol	22.81	25.82	113.2	26-116
36 Dup.	2-Fluoroaniline	23.52	11.73	49.9	*
36 Dup.	d5-Phenol	22.27	20.84	93.6	10-104
36 Dup.	d5-Nitrobenzene	24.77	25.63	103.5	19-115
36 Dup.	2-Fluorobiphenyl	22.27	24.41	96.1	17-125
36 Dup.	2,4,6-Tribromophenol	22.27	19.54	87.7	32-124
Blank	2-Fluorophenol	17.07	20.71	121.3	26-116
Blank	2-Fluoroaniline	26.71	30.27	113.3	*
Blank	d5-Phenol	16.67	15.56	93.3	10-104
Blank	d5-Nitrobenzene	18.53	19.69	106.3	19-115
Blank	2-Fluorobiphenyl	16.67	17.76	106.5	17-125
Blank	2,4,6-Tribromophenol	16.67	16.78	100.7	32-124



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parts per billion (ug/kg)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
7	Dibutylchlorendate	333.	380.	114.	41-121
15	Dibutylchlorendate	333.	686.	206.	41-121
16	Dibutylchlorendate	333.	446.	134.	41-121
22	Dibutylchlorendate	333.	583.	175.	41-121
23	Dibutylchlorendate	333.	406.	122.	41-121
28	Dibutylchlorendate	333.	390.	117.	41-121
29	Dibutylchlorendate	333.	500.	150.	41-121
36	Dibutylchlorendate	333.	669.	201.	41-121
42	Dibutylchlorendate	333.	460.	138.	41-121
Blank	Dibutylchlorendate	333.	483.	145.	41-121
36 Spike I	Dibutylchlorendate	333.	292.	87.8	41-121
36 Spike II	Dibutylchlorendate	333.	380.	114.	41-121

E.P. Toxicity Analyses:

parts per million (mg/L)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
7	Isodrin	0.00200	0.00172	86.0	43-118
15	Isodrin	0.00200	0.00145	72.8	43-118
16	Isodrin	0.00200	0.00146	73.0	43-118
22	Isodrin	0.00200	0.00189	94.3	43-118
23	Isodrin	0.00200	0.00185	92.3	43-118
28	Isodrin	0.00200	0.00193	96.6	43-118
29	Isodrin	0.00200	0.00210	105.	43-118
36	Isodrin	0.00200	0.00209	104.	43-118
42	Isodrin	0.00200	0.00183	91.7	43-118
Blank	Isodrin	0.00200	0.00104	52.0	43-118
Spike I	Isodrin	0.00200	0.00177	88.4	43-118
Spike II	Isodrin	0.00200	0.00205	102.	43-118



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parts per million (mg/L)

<u>Sample No.</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
7	2,4,5-T	0.0400	.0241	60.3	*
15	2,4,5-T	0.0400	.0145	36.3	*
16	2,4,5-T	0.0400	.0203	50.8	*
22	2,4,5-T	0.0400	.0143	35.5	*
23	2,4,5-T	0.0400	.0163	40.7	*
28	2,4,5-T	0.0400	.0215	53.7	*
29	2,4,5-T	0.0400	.0146	36.6	*
36	2,4,5-T	0.0400	.0184	45.9	*
42	2,4,5-T	0.0400	.0232	58.0	*
Blank	2,4,5-T	0.0400	.0292	73.0	*
29 Spike I	2,4,5-T	0.0400	.0428	107.	*
29 Spike II	2,4,5-T	0.0400	.0354	88.5	*

APPENDIX B

Replicate Quality Control Report

<u>Sample #</u>	<u>Analyte</u>	<u>Replicate 1</u>	<u>Replicate 2</u>	<u>Relative Error, %</u>
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PRIORITY POLLUTANT ANALYSES

		<u>%</u>		
42	Total Solids	68.2	66.9	1.9
42	Volatile Solids	6.2	5.1	18.



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LABORATORY NO. 85194

parts per million (mg/kg)

<u>Sample #</u>	<u>Analyte</u>	<u>Replicate 1</u>	<u>Replicate 2</u>	<u>Relative Error, %</u>
42	Antimony	L/0.5	L/0.5	0.
42	Arsenic	15.	10.	33.
42	Beryllium	0.14	0.16	12.
42	Cadmium	1.5	1.6	6.2
42	Chromium	30.	31.	3.2
42	Copper	47.	44.	6.4
42	Lead	62.	50.	19.
42	Mercury	0.66	0.68	2.9
42	Nickel	30.	27.	10.
42	Selenium	L/0.5	L/0.5	0.
42	Silver	0.5	0.6	(0.1)
42	Thallium	L/0.5	L/0.5	0.
42	Zinc	150.	140.	6.7
7 Spike	Phenol	0.8	0.7	12.
22	Cyanide	L/0.5	L/0.5	0.
42	Cyanide	L/0.5	L/0.5	0.

BULK SAMPLE ANALYSES

		<u>%</u>		
22	Sand	28.8	20.0	30.
22	Silt	52.8	59.6	11.
22	Clay	18.4	20.4	10.
22	Total Organic Carbon	2.2	2.2	0.
42	Oil & Grease	0.21	0.28	25.
42	Sulfide	0.005	0.006	(.001)



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parts per million (mg/L)

<u>Sample #</u>	<u>Analyte</u>	<u>Replicate 1</u>	<u>Replicate 2</u>	<u>Relative Error, %</u>
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E.P. TOXICITY ANALYSES

36	Cadmium	L/0.02	L/0.02	0.
36	Chromium	L/0.1	L/0.1	0.
36	Lead	L/0.2	L/0.2	0.
36	Silver	L/0.1	L/0.1	0.
36	Barium	L/0.5	L/0.5	0.
36	Mercury	L/0.005	L/0.005	0.
36	Arsenic	L/0.005	L/0.005	0.
36	Selenium	L/0.005	L/0.005	0.

APPENDIX C

Spike Quality Control Report

<u>Sample #</u>	<u>Analyte</u>	<u>Sample Found</u>	<u>mg/L Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
-----------------	----------------	---------------------	-------------------------	--------------------	-------------------	----------------------

PRIORITY POLLUTANT ANALYSES

42	Antimony	L/0.5	2.5	1.8	72.	*
42	Arsenic	10.	25.	35.	100.	*
42	Beryllium	0.14	0.25	0.27	52.	*
42	Cadmium	1.5	0.5	1.9	80.	*
42	Chromium	30.	100.	130.	100.	*
42	Copper	47.	100.	150.	103.	*
42	Lead	62.	50.	100.	80.	*



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Sample #	Analyte	mg/L			% Recovery	Control Limit
		Sample Found	Spike Level	Spike Found		
42	Mercury	0.66	0.25	0.91	100.	*
**	Nickel	19.	10.	29.	100.	*
42	Selenium	0.4	2.5	3.1	104.	*
42	Silver	0.5	1.0	1.6	110.	*
42	Thallium	L/0.5	2.5	1.9	76.	*
42	Zinc	150.	100.	240.	90.	*
7	Phenol	L/0.1	0.8	0.7	88.	*
7	Phenol	L/0.1	0.8	0.8	100.	*
36	Cyanide	L/0.5	3.3	3.9	118.	*

			<u>ug/L</u>				
36	Spk. I	g.BHC	L/5.	333.	350.	105.	87-107
36	Spk. I	Heptachlor	L/5.	333.	376.	113.	43-125
36	Spk. I	Aldrin	L/5.	333.	380.	114.	43-109
36	Spk. I	Dieldrin	L/5.	333.	376.	113.	56-122
36	Spk. I	Endrin	L/10.	333.	360.	110.	89-101
36	Spk. I	DDT	L/10.	333.	380.	114.	82-102
36	Spk. II	g.BHC	L/5.	333.	523.	157.	87-107
36	Spk. II	Heptachlor	L/5.	333.	529.	159.	43-125
36	Spk. II	Aldrin	L/5.	333.	519.	156.	43-109
36	Spk. II	Dieldrin	L/5.	333.	513.	154.	56-122
36	Spk. II	Endrin	L/5.	333.	523.	157.	89-101
36	Spk. II	DDT	L/5.	333.	423.	127.	82-102

E.P. TOXICITY ANALYSES

		parts per million (mg/L)			% Recovery	Control Limit
		Sample Found	Spike Level	Spike Found		
36	Cadmium	L/0.02	1.0	0.98	98.	*
36	Chromium	L/0.1	1.0	1.0	100.	*
36	Lead	L/0.2	5.0	5.0	100.	*



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Sample #	Analyte	mg/L			% Recovery	Control Limit
		Sample Found	Spike Level	Spike Found		
36	Silver	L/0.1	1.0	0.9	90.	*
36	Barium	L/0.5	10.0	11.1	110.	*
36	Mercury	L/0.005	0.010	0.011	110.	*
36	Arsenic	L/0.005	0.25	0.22	88.	*
36	Selenium	L/0.005	0.25	0.28	112.	*
42 Spk. I	Endrin	L/0.0002	0.004	0.00106	46.4	89-101
42 Spk. II	Endrin	L/0.0002	0.004	0.00162	40.4	89-101
29 Spk. I	2,4-D	L/0.005	0.016	0.0110	68.8	*
29 Spk. I	2,4,5-TP	L/0.005	L/0.016	L/0.0110	68.8	*
29 Spk. II	2,4-D	L/0.005	0.0160	0.0123	76.6	*
29 Spk. II	2,4,5-TP	L/0.002	0.0080	0.00623	77.9	*

BULK SAMPLE ANALYSES

42	Oil & Grease	0.21	1.22	1.38	96.	*
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* No control limits yet established.

** POS sample was spiked too low for observable recovery. Another sample which was run concurrently was spiked appropriately and the results reported here.

() = absolute

The control limits are a statistically derived measure of the level of confidence in the measurement. These control limits determine the range within which the analytical value will fall 95% of the time.



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APPENDIX D

Base Acid Neutral Spike Recoveries

Sample 36 was spiked twice with two different aliquots (22.45 gm) with 1000 ul of 157-3 @ 200 ug/ml. (8.9 ug/gm).

<u>Compounds</u>	<u>MS % Recovery</u>	<u>DS % Recovery</u>	<u>% Deviation</u>
1,2,4-Trichlorobenzene	98.5	101.5	-2.9
Acenaphthene	103.1	98.9	4.1
2,4-Dinitrotoluene	75.6	69.1	9.0
Di-n-butylphthalate	109.8	91.2	18.4
Pyrene	101.1	89.7	11.9
N-nitroso-di-N-propylamine	110.3	113.6	-3.2
1,4-Dichlorobenzene	86.8	89.6	-3.2
Pentachlorophenol	26.5	42.9	-47.2
Phenol	99.3	100.8	-1.5
2-Chlorophenol	100.4	102.0	-1.6
p-Chloro-m-cresol	69.3	68.1	1.7
4-NITROPHENOL	90.1	90.4	-0.3



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LABORATORY NO 85194

APPENDIX E

Comments on Limits of Detection

The laboratory makes every effort to meet the lower limits of detection (LLDs) requested. In some cases, LLDs are elevated due to interferences.

The primary cause of elevated LLDs is sample matrix. Detector response to sample matrix may be determined to be interference, rather than, in this case, pesticides through analytical interpretation. This interpretation will take into account lack of confirmation by a second chromatogram, poor peak shape, interference from a multiple component chemical (i.e., PCBs), etc.

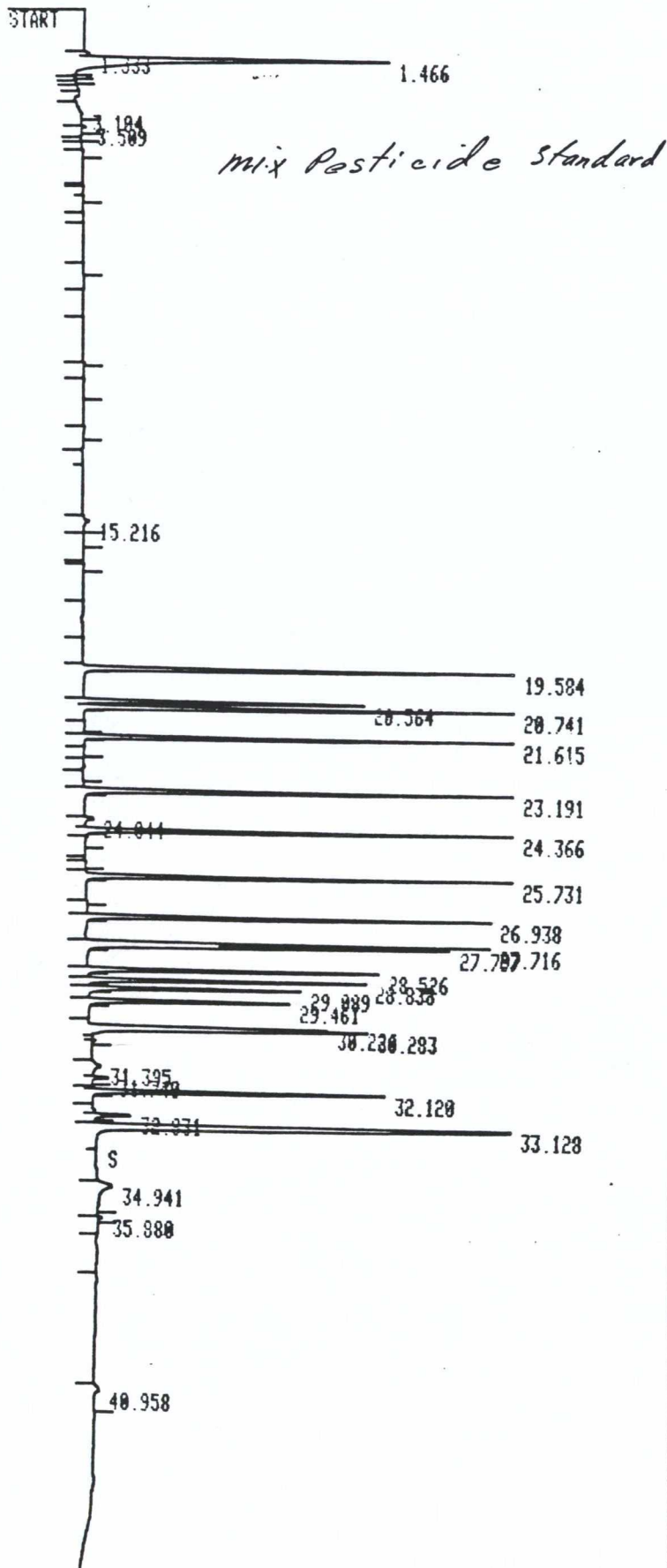
The final result of the interference is that the pesticide cannot be "seen" down to the level which would be achievable without that interference.

Attached are copies of chromatograms for both a mixed pesticide standard and a PCB Arochlor 1260 standard. From reviewing both chromatograms, it can be seen that presence of PCBs in the sample would make it impossible to "read" the presence of pesticides below the level reported to you.



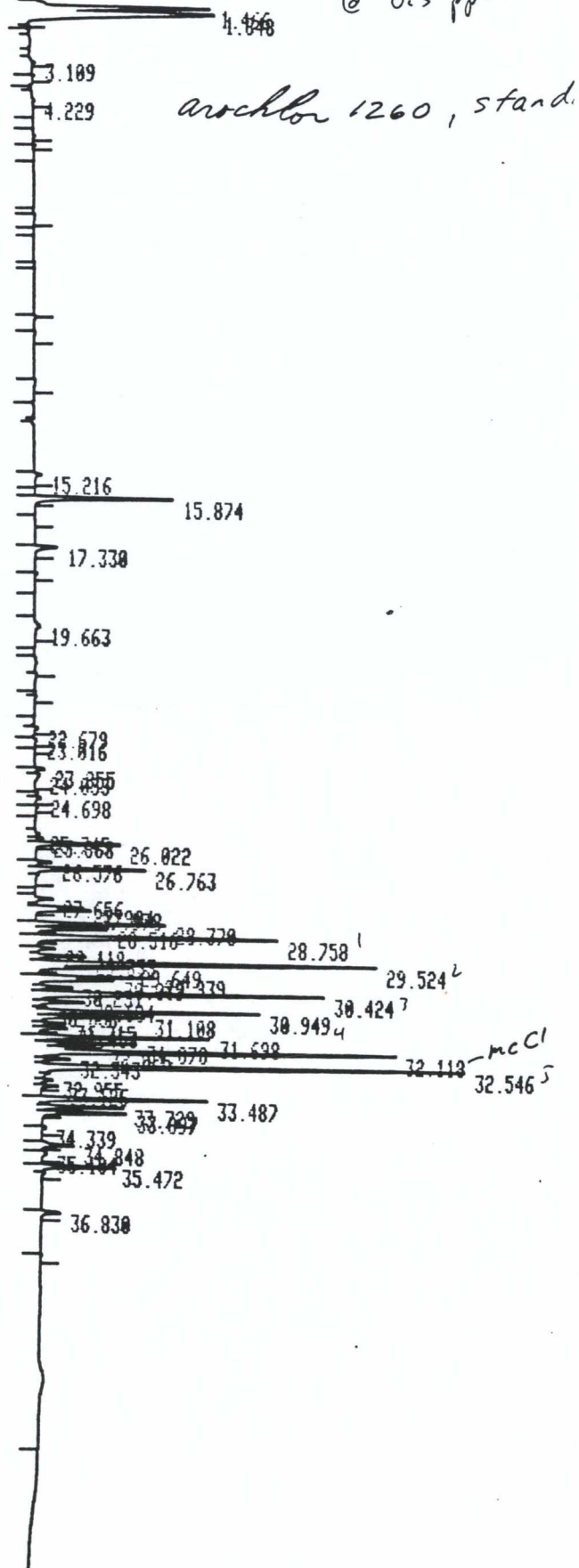
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Std 1415-5



START

Std 1260
@ 0.5 ppm



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CLIENT Port of Seattle
P.O. Box 2309
Seattle, WA 98111
ATTN: Doug Hotchkiss

LABORATORY NO. 86772

DATE Oct. 31, 1984

PO # P-03613

REPORT ON SPOILS

SAMPLE IDENTIFICATION

Samples which were on hold were released for analysis on Sept. 21, 1984. Samples were assigned new laboratory number 86772-1/9. Samples had previously been identified by Laucks Testing Laboratories and Hart Crowser & Associates as shown below:

TESTS PERFORMED AND RESULTS:

	<u>LTL #</u>	<u>HC #</u>
1)	85194-37	1351
2)	85194-38	1352
3)	85194-11	1352B
4)	85194-12	1353
5)	85194-30	1054
6)	85194-33	953
7)	85194-34	954
8)	85194-19	752
9)	85194-20	753

Three composite samples were created by homogeneously mixing equal weight portions from the indicated samples.

Composite A: Samples 1, 2 above
Composite B: Samples 3, 4 above
Composite C: Samples 6, 7 above

Samples 5, 8, and 9 were analyzed without compositing.

Samples were passed through a No. 10 sieve prior to analysis. Only material passing the sieve was analyzed. Percentages retained were as follow:

	<u>A</u>	<u>B</u>	<u>C</u>	<u>5</u>	<u>8</u>	<u>9</u>
% retained	L/2.	5.	L/2.	L/2.	L/2.	16.
major description	---	wood	---	---	---	rocks
minor description	---	rocks	---	---	---	wood



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Routine analyses were then performed on the samples, with results as follow:

	<u>A</u>	<u>B</u>	<u>C</u>	<u>5</u>	<u>8</u>	<u>9</u>
	<u>%, as received basis</u>					
Total Solids	77.8	60.8	69.9	78.3	44.6	53.5
	<u>%, dry basis</u>					
Total Organic Carbon	0.2	4.0	1.5	0.5	3.8	4.0
Total Volatile Solids	1.3	7.4	3.1	1.4	11.5	6.6
Oil & Grease	0.07	0.88	0.25	0.02	2.0	0.98
Sulfide as S	0.003	L/0.001	0.002	L/0.001	0.33	0.10

Grain Size Analysis

Sand	90.2	35.3	65.7	88.6	10.8	8.8
Silt	9.8	46.6	27.2	9.4	70.4	60.1
Clay	L/0.1	18.1	7.1	2.0	18.8	31.1

Samples were analyzed for priority pollutants in accordance with 40 CFR, part 136, with results as shown below:

Inorganics

parts per million (mg/kg), dry basis

Antimony	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Arsenic	3.1	19.	4.0	2.2	23.	15.
Beryllium	0.16	0.33	0.21	0.13	0.22	0.50
Cadmium	0.2	3.2	0.5	0.1	7.4	4.8
Chromium	15.	49.	18.	10.	110.	92.
Copper	14.	97.	26.	15.	200.	150.
Lead	18.	170.	40.	33.	340.	190.
Mercury	0.2	1.1	0.2	L/0.1	1.6	0.9
Nickel	9.	36.	20.	10.	61.	92.
Selenium	L/0.5	0.5	L/0.5	L/0.5	1.5	0.5



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	<u>A</u>	<u>B</u>	<u>C</u>	<u>5</u>	<u>8</u>	<u>9</u>
	parts per million (mg/kg), dry basis					
Silver	0.24	2.5	0.21	L/0.05	3.4	1.9
Thallium	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
Zinc	38.	320.	80.	27.	700.	970.
Total Cyanide	L/0.10	0.32	L/0.10	L/0.10	0.60	0.24
Total Phenol	L/0.15	L/0.15	L/0.15	L/0.15	L/0.15	L/0.15

Volatile Organics (by GC/MS)

parts per billion (ug/kg)

	<u>A</u>	<u>B</u>	<u>C</u>	<u>5</u>	<u>8</u>	<u>9</u>	<u>Method Blank</u>
Chloromethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Bromomethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Vinyl Chloride	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Chloroethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Methylene Chloride	368.	828.	646.	394.	360.	1040.	tr
Acrolein	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.
*Acetone	455.	939.	316.	330.	334.	313.	18.
Acrylonitrile	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.	L/10.
*Carbon Disulfide	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
1,1-Dichloroethylene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
1,1-Dichloroethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
trans-1,2-Dichloroethylene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Chloroform	L/10.	L/10.	tr	L/10.	tr	L/10.	L/10.
*2-Butanone	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
1,2-Dichloroethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
1,1,1-Trichloroethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
*Vinyl Acetate	L/10.	L/10.	tr	L/10.	L/10.	L/10.	L/10.
Bromodichloromethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.



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	parts per billion (ug/kg)						Method
	A	B	C	5	8	9	Blank
Carbon Tetrachloride	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
1,2-Dichloropropane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Trichloroethylene	L/10.	L/10.	tr	L/10.	L/10.	L/10.	L/10.
Benzene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Chlorodibromomethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
1,1,2-Trichloroethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
2-Chloroethyl vinyl ether	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Bromoform	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
*4-Methyl-2-pentanone	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	tr
*2-Hexanone	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	tr
1,1,2,2-Tetrachloroethane	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Tetrachloroethylene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Toluene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Chlorobenzene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
trans-1,3-Dichloropropene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Ethylbenzene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
cis-1,3-Dichloropropene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
Styrene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.
o-Xylene	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.	L/10.

tr = 1-10 ug/kg



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Extractables (by GC/MS)

parts per billion (ug/kg)

	<u>A</u>	<u>B</u>	<u>C</u>	<u>5</u>	<u>8</u>	<u>9</u>	<u>Method Blank</u>
N-nitrosodimethylamine	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroethyl)ether	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
2-Chlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Phenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
1,3-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
1,4-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
1,2-Dichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroisopropyl)ether	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachloroethane	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
N-nitroso-di-n-propylamine	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Nitrobenzene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Isophorone	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
2-Nitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dimethylphenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-chloroethoxy)methane	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
1,2,4-Trichlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Naphthalene	L/100.	380.	tr	tr	190.	280.	L/100.
Hexachlorobutadiene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
4-Chloro-m-cresol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachlorocyclopentadiene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.



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	parts per billion (ug/kg)						Method
	A	B	C	5	8	9	Blank
2,4,6-Trichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
2-Chloronaphthalene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Acenaphthylene	L/100.	L/100.	L/100.	L/100.	160.	L/100.	L/100.
Dimethylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
2,6-Dinitrotoluene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Acenaphthene	L/100.	L/100.	L/100.	L/100.	120.	490.	L/100.
2,4-Dinitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
2,4-Dinitrotoluene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
4-Nitrophenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Fluorene	L/100.	210.	L/100.	L/100.	130.	590.	L/100.
4-Chlorophenyl phenyl ether	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Diethylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
4,6-Dinitro-o-cresol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
1,2-Diphenylhydrazine	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
4-Bromophenyl phenyl ether	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Hexachlorobenzene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Pentachlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Phenanthrene	150.	910.	200.	L/100.	580.	1620.	L/100.
Anthracene	100.	1180.	240.	L/100.	880.	650.	L/100.
Dibutylphthalate	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Fluoranthene	480.	5950.	520.	L/100.	6370.	3910.	L/100.
Pyrene	340.	5580.	330.	L/100.	3790.	2560.	L/100.
Benzidine	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.



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LABORATORY NO. 87662

	parts per billion (ug/kg)						Method
	A	B	C	5	8	9	Blank
Butyl benzyl phthalate	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(a)anthracene	180.	2110.	140.	L/100.	1570.	1040.	L/100.
Chrysene	200.	2200.	160.	L/100.	1620.	1070.	L/100.
3,3'-Dichlorobenzidine	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Bis(2-ethylhexyl)phthalate	2390.	2550.	780.	460.	4760.	L/100.	L/100.
N-nitrosodiphenylamine	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Di-n-octyl phthalate	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(b)fluoranthene	320.	2200.	160.	L/100.	2330.	1270.	L/100.
Benzo(k)fluoranthene	**	**	**	**	**	**	**
Benzo(a)pyrene	260.	1580.	360.	L/100.	1480.	1180.	L/100.
Indeno(1,2,3-cd)pyrene	L/100.	630.	L/100.	L/100.	L/100.	L/100.	L/100.
Dibenzo(ah)anthracene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
Benzo(ghi)perylene	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
2,3,7,8-Tetrachlorodibenzo- p-dioxin (TCDD)	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*Aniline	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*Benzoic Acid	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*Benzyl Alcohol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Chloroaniline	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*Dibenzofuran	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*2-Methylnaphthalene	L/100.	L/100.	L/100.	L/100.	110.	L/100.	L/100.
*2-Methylphenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Methylphenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.



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	<u>parts per billion (ug/kg)</u>						<u>Method Blank</u>
	<u>A</u>	<u>B</u>	<u>C</u>	<u>5</u>	<u>8</u>	<u>9</u>	
*2-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*3-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*4-Nitroaniline	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.
*2,4,5-Trichlorophenol	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.	L/100.

tr = 50-100 ug/kg

	<u>A</u>	<u>B</u>	<u>C</u>	<u>5</u>	<u>8</u>	<u>9</u>
<u>Pesticides (by GC/ECD)</u>	<u>parts per billion (ug/kg)</u>					
alpha-BHC	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
beta-BHC	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
delta-BHC	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
gamma-BHC (lindane)	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
heptachlor	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
aldrin	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
heptachlor epoxide	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
dieldrin	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
4,4'-DDE	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
4,4'-DDD	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
endosulfan sulfate	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
4,4'-DDT	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
chlordane	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
alpha endosulfan	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
beta endosulfan	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
endrin	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
endrin aldehyde	L/1.	L/1.	L/1.	L/1.	L/1.	L/1.
toxaphene	L/50.	L/50.	L/50.	L/50.	L/50.	L/50.



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	<u>A</u>	<u>B</u>	<u>C</u>	<u>5</u>	<u>8</u>	<u>9</u>
	<u>parts per billion (ug/kg)</u>					
PCB 1016	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1221	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1232	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1242	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1248	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1254	L/20.	L/20.	L/20.	L/20.	L/20.	L/20.
PCB 1260	66.	120.	L/20.	L/20.	140.	150.

Key

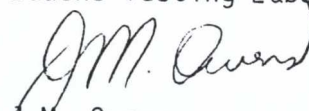
L/ indicates "less than".

* Additional compounds from the EPA's Hazardous Substances List.

** Value shown for Benzo(b)fluoranthene is the sum of the isomers Benzo(b)fluoranthene and Benzo(k)fluoranthene.

Respectfully submitted,

Laucks Testing Laboratories, Inc.


J.M. Owens

JMO:veg



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APPENDIX A

Replicate Quality Control Report

Inorganics

<u>Sample</u>	<u>Analyte</u>	<u>Replicate 1</u>	<u>Replicate 2</u>	<u>Relative Error</u>
		<u>%</u>		
A	Total Solids	77.8	77.6	0.2
		<u>%, dry basis</u>		
A	Volatile Solids	1.3	1.3	0.
8	Total Organic			
	Carbon	4.1	3.8	7.3
9	Oil & Grease	0.98	0.81	17.
8	Sulfide as S	0.33	0.19	42.
8	Sand	10.8	9.4	13.
8	Silt	70.4	67.7	3.8
8	Clay	18.8	22.9	18.



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<u>Sample</u>	<u>Analyte</u>	<u>Replicate 1</u>	<u>Replicate 2</u>	<u>Relative Error</u>
<u>parts per million (mg/kg), dry basis</u>				
C	Cyanide	L/0.10	L/0.10	0.
D	Mercury	0.2	0.2	0.
9	Nickel	92.	88.	4.3
9	Zinc	970.	1000.	3.0
9	Chromium	92.	92.	0.
9	Arsenic	15.	15.	0.
9	Copper	150.	160.	6.2
9	Lead	190.	220.	14.
9	Cadmium	4.8	5.4	11.
9	Thallium	L/1.	L/1.	(0.)
9	Selenium	0.5	0.5	(0.)
A	Phenol	L/0.15	L/0.15	0.
9	Beryllium	0.50	0.44	12.
9	Antimony	L/1.	L/1.	(0.)
9	Silver	1.9	1.0	47.

() indicates absolute error

L/ indicates "less than"



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APPENDIX B

Spike Quality Control Report

Inorganics

<u>Sample</u>	<u>Analyte</u>	<u>Sample Found</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>
<u>%, dry basis</u>					
A	Oil & Grease	0.07	1.24	1.32	101.
<u>parts per million (mg/kg), dry basis</u>					
C	Mercury	0.2	0.3	0.5	100.
C	Cyanide	L/0.10	0.98	0.31	32.
9	Cyanide	0.24	1.5	1.4	77.
9	Nickel	92.	100.	192.	100.
9	Zinc	970.	250.	1230.	104.
9	Chromium	92.	100.	196.	104.
9	Arsenic	15.	20.	33.	90.
9	Copper	150.	200.	350.	100.
9	Lead	190.	110.	310.	109.
9	Cadmium	4.8	11.	15.2	94.
B	Thallium	L/1.	2.5	5.4	216.
9	Selenium	0.5	2.0	2.3	90.
5	Phenol	L/0.15	0.85	0.78	92.
9	Beryllium	0.50	0.50	1.00	100.
9	Antimony	L/1.	10.	3.6	36.
9	Silver	1.9	0.96	2.7	83.

L/ indicates "less than"



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APPENDIX C

Surrogate Recovery Quality Control Report

Listed below are surrogate (chemically similar) compounds utilized in the analysis of volatile and organic compounds. The surrogates are added to every sample prior to extraction and analysis to monitor for matrix effects, purging efficiency, and sample processing errors. The control limits represent the 95% confidence interval established in our laboratory through repetitive analysis of these sample types. In certain cases, we will have accumulated insufficient data to have established control limits.

<u>Sample #</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limits</u>
<u>parts per million (mg/kg)</u>					
A	d4-1,2-Dichloroethane	0.735	0.761	103.6	50-160
A	d8-Toluene	0.735	0.696	94.7	50-160
A	Bromofluorobenzene	0.735	0.821	111.7	50-160
B	d4-1,2-Dichloroethane	0.698	0.553	79.2	50-160
B	d8-Toluene	0.698	0.685	98.2	50-160
B	Bromofluorobenzene	0.698	0.808	115.8	50-160
C	d4-1,2-Dichloroethane	0.676	0.633	93.6	50-160
C	d8-Toluene	0.676	0.677	100.1	50-160
C	Bromofluorobenzene	0.676	0.779	115.2	50-160
Blank	d4-1,2-Dichloroethane	0.050	0.0496	99.3	50-160
Blank	d8-Toluene	0.050	0.0501	100.1	50-160
Blank	Bromofluorobenzene	0.050	0.0550	109.9	50-160
Spike	d4-1,2-Dichloroethane	0.370	0.382	103.3	50-160
Spike	d8-Toluene	0.370	0.355	95.9	50-160
Spike	Bromofluorobenzene	0.370	0.391	105.8	50-160
Dupe	d4-1,2-Dichloroethane	0.368	0.370	100.6	50-160
Dupe	d8-Toluene	0.368	0.345	93.8	50-160
Dupe	Bromofluorobenzene	0.368	0.396	107.5	50-160



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<u>Sample #</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limits</u>
<u>parts per million (mg/kg)</u>					
5	d4-1,2-Dichloroethane	0.372	0.360	96.7	50-160
5	d8-Toluene	0.372	0.368	98.9	50-160
5	Bromofluorobenzene	0.372	0.409	110.0	50-160
8	d4-1,2-Dichloroethane	0.865	0.870	100.6	50-160
8	d8-Toluene	0.865	0.886	102.4	50-160
8	Bromofluorobenzene	0.865	0.976	112.8	50-160
9	d4-1,2-Dichloroethane	0.700	0.734	104.8	50-160
9	d8-Toluene	0.700	0.648	92.6	50-160
9	Bromofluorobenzene	0.700	0.768	109.7	50-160
<u>parts per billion (ug/kg)</u>					
A	2-Fluorophenol	4096.	3328.	81.2	24-133
A	2-Fluoroaniline	4224.	1042.	24.7	---
A	d5-Phenol	4000.	2645.	66.1	20-122
A	2-Bromophenol	4000.	2552.	63.8	---
A	d5-Nitrobenzene	4224.	2915.	69.0	20-140
A	2-Fluorobiphenyl	4000.	3188.	79.7	20-140
A	2,4,6-Tribromophenol	4000.	1496.	37.4	10-114
A	d14-p-Terphenyl	4000.	2920.	73.0	20-150
B	2-Fluorophenol	4096.	3002.	73.3	24-133
B	2-Fluoroaniline	4224.	1049.	24.8	---
B	d5-Phenol	4000.	2456.	61.4	20-122
B	2-Bromophenol	4000.	2616.	65.4	---
B	d5-Nitrobenzene	4224.	2581.	61.1	20-140
B	2-Fluorobiphenyl	4000.	3292.	82.3	20-140
B	2,4,6-Tribromophenol	4000.	2512.	62.8	10-114
B	d14-p-Terphenyl	4000.	3468.	86.7	20-150



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<u>Sample #</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limits</u>
<u>parts per billion (ug/kg)</u>					
C	2-Fluorophenol	4096.	1896.	46.3	24-133
C	2-Fluoroaniline	4224.	966.	22.8	---
C	d5-Phenol	4000.	1547.	38.7	20-122
C	2-Bromophenol	4000.	1648.	41.2	---
C	d5-Nitrobenzene	4224.	1748.	41.4	20-140
C	2-Fluorobiphenyl	4000.	2376.	59.4	20-140
C	2,4,6-Tribromophenol	4000.	1996.	49.9	10-114
C	d14-p-Terphenyl	4000.	1728.	43.2	20-150
5	2-Fluorophenol	4096.	3274.	79.9	24-133
5	2-Fluoroaniline	4224.	2141.	50.7	---
5	d5-Phenol	4000.	2748.	68.7	20-122
5	2-Bromophenol	4000.	2700.	67.5	---
5	d5-Nitrobenzene	4224.	3070.	72.7	20-140
5	2-Fluorobiphenyl	4000.	3416.	85.4	20-140
5	2,4,6-Tribromophenol	4000.	2720.	68.0	10-114
5	d14-p-Terphenyl	4000.	2864.	71.6	20-150
8	2-Fluorophenol	4096.	2776.	67.8	24-133
8	2-Fluoroaniline	4224.	1510.	35.7	---
8	d5-Phenol	4000.	2296.	57.4	20-122
8	2-Bromophenol	4000.	2708.	67.7	---
8	d5-Nitrobenzene	4224.	2537.	60.1	20-140
8	2-Fluorobiphenyl	4000.	3036.	75.9	20-140
8	2,4,6-Tribromophenol	4000.	2856.	71.4	10-114
8	d14-p-Terphenyl	4000.	2600.	65.0	20-150
9	2-Fluorophenol	4096.	3338.	81.5	24-133
9	2-Fluoroaniline	4224.	1624.	38.5	---
9	d5-Phenol	4000.	2536.	63.4	20-122
9	2-Bromophenol	4000.	2664.	66.6	---
9	d5-Nitrobenzene	4224.	2959.	70.1	20-140
9	2-Fluorobiphenyl	4000.	3624.	90.6	20-140
9	2,4,6-Tribromophenol	4000.	3032.	75.8	10-114
9	d14-p-Terphenyl	4000.	3812.	95.3	20-150



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<u>Sample #</u>	<u>Surrogate Compound</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limits</u>
<u>parts per billion (ug/kg)</u>					
Spike	2-Fluorophenol	4096.	3242.	79.2	24-133
Spike	2-Fluoroaniline	4224.	1710.	40.5	---
Spike	d5-Phenol	4000.	3156.	78.9	20-122
Spike	2-Bromophenol	4000.	2776.	69.4	---
Spike	d5-Nitrobenzene	4224.	3105.	73.5	20-140
Spike	2-Fluorobiphenyl	4000.	3208.	80.2	20-140
Spike	2,4,6-Tribromophenol	4000.	2752.	68.8	10-114
Spike	d14-p-Terphenyl	4000.	2824.	70.6	20-150
Dupe	2-Fluorophenol	4096.	3475.	84.8	24-133
Dupe	2-Fluoroaniline	4224.	1682.	39.8	---
Dupe	d5-Phenol	4000.	3173.	79.3	20-122
Dupe	2-Bromophenol	4000.	2812.	70.3	---
Dupe	d5-Nitrobenzene	4224.	3252.	77.0	20-140
Dupe	2-Fluorobiphenyl	4000.	3383.	84.6	20-140
Dupe	2,4,6-Tribromophenol	4000.	2945.	73.6	10-114
Dupe	d14-p-Terphenyl	4000.	2952.	73.8	20-150
Blank	2-Fluorophenol	4096.	2858.	69.8	24-133
Blank	2-Fluoroaniline	4224.	2601.	61.6	---
Blank	d5-Phenol	4000.	2440.	61.0	20-122
Blank	2-Bromophenol	4000.	2229.	55.7	---
Blank	d5-Nitrobenzene	4224.	2628.	62.2	20-140
Blank	2-Fluorobiphenyl	4000.	2892.	72.3	20-140
Blank	2,4,6-Tribromophenol	4000.	2211.	55.3	10-114
Blank	d14-p-Terphenyl	4000.	2825.	70.6	20-150
A	Dibutylchloredate	20.0	10.5	52.7	20-150
B	Dibutylchloredate	20.0	4.94	24.7	20-150
C	Dibutylchloredate	20.0	17.2	86.1	20-150
5	Dibutylchloredate	20.0	17.0	84.9	20-150
8	Dibutylchloredate	20.0	4.46	22.3	20-150
9	Dibutylchloredate	20.0	10.9	54.3	20-150
Blank	Dibutylchloredate	20.0	26.8	134.	20-150
5 MS	Dibutylchloredate	20.0	15.5	77.7	20-150
5 MSD	Dibutylchloredate	20.0	16.9	84.7	20-150



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APPENDIX D

Matrix Spike/Duplicate Spike

Quality Control Report

Organics

Reported below are the results of additional QC compounds utilized in the analysis of organic compounds. Compounds of interest are spiked into two additional sample aliquots prior to extraction and/or analysis to monitor for matrix effects, sample processing errors, and to calculate percent recoveries of compounds of interest and relative error in the analysis. The control limits represent the 95% confidence interval established in the laboratory through repetitive analysis of samples.

Compound	Conc Spike	Conc Samp	Conc MS	% REC	Conc MSD	% REC	RPD	RPD Limit	REC Limit
1,1-Dichloroethene	125.	0.	169.	135.	178.	142.	-4.9	22.	59-172
Trichloroethene	125.	0.	142.	114.	155.	124.	-8.4	24.	62-137
Chlorobenzene	125.	0.	133.	106.	144.	115.	-7.6	21.	60-133
Toluene	125.	0.	142.	114.	148.	118.	-3.8	21.	59-139
Benzene	125.	0.	127.	102.	136.	109.	-6.8	21.	66-142
1,2,4-Trichlorobenzene	50.	0.	37.1	74.2	38.1	76.2	-2.6	23.	38-107
Acenaphthene	50.	0.	44.4	88.8	44.5	89.0	-0.2	19.	31-137
2,4-Dinitrotoluene	50.	0.	34.0	68.0	33.8	67.6	0.6	47.	28-89
Di-n-Butylphthalate	50.	0.	42.0	84.0	44.2	88.4	-5.1	47.	29-135
Pyrene	10.	0.	8.91	89.1	8.41	84.1	5.7	36.	35-142
N-Nitrosodipropylamine	50.	0.	45.5	91.0	45.3	90.6	0.5	38.	41-126.
1,4-Dichlorobenzene	50.	0.	37.4	74.8	36.6	73.2	2.1	27.	28-104
Pentachlorophenol	100.	0.	44.3	44.3	46.2	46.2	-4.2	47.	17-109
Phenol	100.	0.	72.4	72.4	71.5	71.5	1.3	35	26-90
2-Chlorophenol	100.	0.	70.7	70.7	70.5	70.5	0.3	50	25-102
P-Chloro-m-cresol	100.	0.	65.2	65.2	61.2	61.2	6.3	33.	26-103
4-Nitrophenol	100.	0.	46.2	46.2	40.6	40.6	12.9	50.	11-114



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Concentrations in the spike, matrix spike and matrix spike duplicate are shown in parts per billion (ug/kg).

Conc = Concentration
Samp = Sample
MS = Matrix Spike
MSD = Matrix Spike Duplicate
REC = Recovery
RPD = Relative Percent Difference



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Laucks

Testing Laboratories, Inc.

940 South Harney Street, Seattle, Washington 98108 (206) 767-5060

Chemistry, Microbiology, and Technical Services



Certificate

Port of Seattle

PAGE NO. 19

LABORATORY NO. 86772

APPENDIX E

Spike Quality Control Report

Organics Pesticide Fraction

<u>Sample</u>	<u>Analyte</u>	<u>Sample Found</u>	<u>Spike Level</u>	<u>Spike Found</u>	<u>% Recovery</u>	<u>Control Limit</u>
<u>parts per billion (ug/kg)</u>						
5 MS	Lindane	L/1.	8.0	2.66	33.3	46-127*
5 MS	Heptachlor	L/1.	8.0	2.08	26.0	35-130*
5 MS	Aldrin	L/1.	8.0	4.72	58.9	34-132
5 MS	Dieldrin	L/1.	20.4	7.4	36.6	31-134
5 MS	Endrin	L/1.	20.	7.24	36.2	42-139*
5 MS	4,4'-DDT	L/1.	20.0	14.3	71.3	23-134
5 MSD	Lindane	L/1.	8.0	2.12	26.5	46-127*
5 MSD	Heptachlor	L/1.	8.0	1.66	20.7	35-130*
5 MSD	Aldrin	L/1.	8.0	8.87	111.	34-132
5 MSD	Dieldrin	L/1.	20.4	8.61	42.2	31-134
5 MSD	Endrin	L/1.	20.0	8.99	45.0	42-139
5 MSD	4,4'-DDT	L/1.	20.0	16.8	83.9	46-127

* Lower than normal recoveries may sometimes be attributable to sample matrix effects. Specifically, sulfur may cause suppression of the compound signals. Sulfur was recognized as present in the sample residue matrix, and clean-up steps were taken to alleviate the problem.



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Minor

T-91 DONOR SITES ,SHILSHOLE & T-91 MITIGATION

BORING	SAMPLE	DEPTH RANGE(ft)	LAB #		AMPHIPOD BIOASSAY # SURVIVE P/F /std dev	HEAVY METALS P/F:Met.F	PCBs P/F (ppb)	DDTs P/F (ppb)	LOW PAHs P/F (ppb)	HIGH PAHs P/F (ppb)	OTHER DATA (O&G=oil & grease)
			LK	EVS							
SHILSHOLE MAINT	1,2,3,4	0-3.5	A	A	P 19.4/0.5	P	P (nd)	P (nd)	P (68)	P (nd)	O&G (nd)
T-115 MAINT	5,22	0-5	B	B	P 15.2/2.6	F:As,Cd,Cu Pb	P (320)	F (47)	F (3530)	P (12410)	O&G 0.32%
	6,23	5-9	C	C	P 19/1.2	P	P (nd)	P (nd)	P (410)	P (1300)	O&G 0.02%
T-115 S.F.	7,9	0-5	D	D	P 18/0.7	F: Hg	P (160)	P (3)	P (560)	P (4450)	O&G 0.16%
	8,10	5-9	E	E	P 18/1.2	P	P (nd)	P (1)	P (nd)	P (260)	O&G 0.16%
T-105 MAINT	20,21	0-3.5	I	I	P 18/2	F:As,Cd,Cu Pb,Zn	P (640)	F (20)	F (2570)	F (13910)	O&G 0.49%
T-91 MAINT	18,19	6-12	H	H	P 15.6/2.6	F:Pb	P (630)	P (6)	F (24920)	F (46310)	O&G 0.42%
	17	0-6	17	17	F 11.4/3.3	F: Cd,Cu,Pb Zn	P (190)	F (67)	F (28100)	F (67950)	O&G 1.5%
T-91 MITIG	11,14	0-6	F	F	P 18.6/0.5	P	P (nd)	P (nd)	P (nd)	P (nd)	O&G (nd)
	12,13	5-15	G	G	P 15.4/1.7	P	P (nd)	P (nd)	P (nd)	P (70)	O&G 0.02%
	16	15-18	16	16	P 19/0.7	P	P (nd)	P (nd)	P (nd)	P (3550)	O&G 0.03%

Minor Dredge Sites

Terminal 91, Short Fill Source Sampling
Sampling Schedule

Table 1

<u>Location</u>	<u>Anticipated Dredge Quantity</u>	<u>No. of Sampling Borings</u>	<u>Total No. of Samples</u>
<i>Ⓟ</i> T91 Mitigation Cut Area	13,000 c.y.	2	6
T91, Pier 90E Maint. Dredging	4,000 c.y.	1	3
T115 Maint. Dredging	11,000 c.y.	2	4
T115 SeaFreeze Maint. Dredging	5,300 c.y.	2	4
T105 Maint. Dredging	3,000 c.y.	1	2
SBM Maint. Dredging	1,700 c.y.	4	1

GL:pjn/3713E

*Ⓟ This material was cleaner so it went on top as a part of
the cap*

000
Re: Port of Seattle 89906
Date: June 11, 1985

The last of the samples for this job were rec'd 6/10/85.

The compositing scheme is as follows:

				High Chem						
				Shilshole						
Composite A:	Consists of samples	1,2,3,4		AS	CO	CU	Pb	LO PPM	NOT	
Composite B:	Consists of samples	5,22	T-115 Maint. 0-5	47	1.2	160	160	3800	47	
Composite C:	Consists of samples	6,23	T-115 Maint. 5-9							
Composite D:	Consists of samples	7,9	T-115 S.F. 0-5	Hg 1.6						
Composite E:	Consists of samples	8,10	T-115 S.F. 5-9							
Composite F:	Consists of samples	11,14	T-91 Mit 0-6							
Composite G:	Consists of samples	12,13,15	T-91 Mit 5-15							
Composite H:	Consists of samples	18,19	T-91 Maint 6-12	Pb 160	LO PPM 25,000	N: PPM 46,000				
Composite I:	Consists of samples	20,21	T-105 Maint 0-35	AS 44	CO 1.1	CU 200	Pb 330	Zn 850	LO PPM 2,600	N: PPM 13,900
Sample #16 to be analyzed singly, uncomposited										
Sample #17 to be analyzed singly, uncomposited				CD 1.9	CU 130	Pb 300	Zn 550	LO PPM 25,000	N: PPM 68,000	NOT 67

Each sample consists of the following: two 1-qt jars; one bag; 1 horse cup
for sulfide.

Composite A has already been created and currently resides in the walk-in.

We need to deliver the sample splits for amphipod bioassay tomorrow (early
as possible) to EVS. We would like to deliver a minimum of one liter; they
prefer to have two. The samples for delivery should be given to the office
cooled, in an ice chest.

*This describes the compositing. See attached
for individual sample ID.*

No. 89906

W F R S 3E-2A3H

CLIENT <u>Landau Port of Seattle</u>	DATE RECEIVED <u>5-24</u>	SAMPLE TYPE <u>dredge</u>	Plastic Jars	
	PROM. DATE	EST. DATE	NO. SAMPLES <u>4</u>	Y <u>8</u> R <u>13</u> EX <u>4</u> BACT <u>0295</u> B <u>4</u> G <u>4</u> V <u>4</u> OTHER
	P.O. NUMBER <u>P-03848</u>		INORG. <input checked="" type="checkbox"/>	ORG. <input type="checkbox"/> MICRO. <input type="checkbox"/> JMO <input type="checkbox"/> OTHER <input type="checkbox"/>
ATTN.	PHONE NO.		QC REPORT: <input type="checkbox"/> REQ'D. <input type="checkbox"/> NOT REQ'D.	

REMARKS	5/24 Doug will advise compositing on 5/28. 5/30 " says #1-4 = one composite. 6/4 Old Doug is add'l composite - he'll advise 6/5 Doug says bit time slide on #1 - he knows replaced will be too old.	Project Name: Pier 91 Short Fill Dredge Site Testing
---------	--	---

LAB NO.	SAMPLE DESIGNATION	ANALYSIS
1	Port of Seattle Shilshole - Boring #1 site JTK 5-23-85	1500 WDE
2	↓	1430 ↓
3	↓	1440 ↓
4	↓	1345 ↓
	5-21 recd 6-3 SU attached for marks	
	22+23 recd 6-10 " " "	

NOTES TO THE LAB		CODE NO.	DATE
		FIGURE BILL	CAT. CODE AMOUNT
ANALYST			
CHECKER			TOTAL ▶
COMP. DATE		ADV. PAYMENT	No. 89906

[illegible]

Pos # F9906 OK'd 6-13

EFFICIENCY LINE # 22-206

	1	2	3	4	5	6	7	8	9	
1	<u>Grain Size</u>		<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	
2	Sand		93.7	14.8	89.0	47.7	72.7	55.8	53.7	
3	Silt		5.0	74.3	10.4	45.1	25.7	37.6	40.0	
4	Clay		1.3	10.9	.6	7.2	1.6	6.6	6.3	
5										
6			<u>H</u>	<u>I</u>	<u>16</u>	<u>17</u>				
7	Sand			17.3	89.5	67.4				
8	silt			69.9	10.5	30.1				
9	Clay			12.8	ND	2.5				
10										
11										
12			<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	
13	HH *		ND	ND						
14										
15			<u>H</u>	<u>I</u>	<u>16</u>	<u>17</u>				
16	HH *		ND	2400 ND	46 ND	ND				
17										
18										
19	* PNAs are being performed.									
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										

will follow 7/11-16

Final changes 7/11/16

SOILS ANALYSIS REPORT

Lab # 89906
 Date Rec'd 10/2/82
 Date Rec'd 10/2/82
 Analyst TC
 Client PLC

Samples were passed through a No. 10 sieve prior to analysis. Only material passing the sieve was analyzed. Percentages retained were as follow:

	1	2	3	4	5	6	110
% retained	6	19	19	4	38		
major description	fine			medium	medium		
minor description		medium		medium	medium		

Routine analyses were then performed on the samples, with results as follow:

% as received basis

	1	2	3	4	5	6	110
Total Solids	78.8	71.5	50.3	78.0	54.4		

% dry basis

	1	2	3	4	5	6	110
Chemical Oxygen Demand	2.4	2.1	2.8	.7	6.6		
Total Volatile Solids	2.3	3.9	7.3	7.3	6.8		
Oil & Grease	.02	.49	.49	.03	.15		
Sulfide as S	.002	.046	.19	.002	.76		

parts per million (mg/kg), dry basis

	1	2	3	4	5	6	110
Cadmium							
Copper							
Chromium							
Lead							
Zinc							
Mercury							
Arsenic							
PCBs							

Group I give sample to Group II
 See alternate analyses on back of this page

Lab # 19906
 Date Rec'd 02/27
 Date Due 03/06
 Analyst 3
 Client 761

Samples were passed through a No. 10 sieve prior to analysis. Only material passing the sieve was analyzed. Percentages retained were as follows:

	1	2	3	4	5	6	LLD
% retained	9	2	2	3	4	7	
major description	rocks and shells						
minor description	shell rocks						

Routine analyses were then performed on the samples, with results as follows:

1. as received basis

	1	2	3	4	5	6	LLD
--	---	---	---	---	---	---	-----

X Total Solids	788	520	779	604	967	821	
----------------	-----	-----	-----	-----	-----	-----	--

2. dry basis

	1	2	3	4	5	6	LLD
--	---	---	---	---	---	---	-----

X Chemical Oxygen Demand	TPC	08	9.5	8	26	25	17
X Total Volatile Solids		10	72	15	53	23	23
X Oil & Grease	ND	32	ND	16	ND	ND	ND
X Sulfide (ppm)	602	180	203	162	607	601	

parts per million (mg/kg), dry basis

	1	2	3	4	5	6	LLD
--	---	---	---	---	---	---	-----

Cadmium							
Copper							
Chromium							
Lead							
Zinc							
Mercury							
Arsenic							
PCBS							

Group 1 plus Group 2 to Group 41
 See also back of pages on back of this page

INORGANIC PRIORITY POLLUTANT DATA SHEET

Lab No. 89906
 Client P&S
 Rec'd 6-13 OK'd
 Due _____
 Analyst _____
 Chkd _____

☒ Full metal scan
☐ Partial scan (check metals of interest)

Reporting units: mg/Kg Dry

Sample Number

✓		A	B	C	D	E	F	G	H	Blank	LLD	Minimum Acceptable LLD
✓	Antimony	ND	2	ND	ND	ND	ND	ND	ND		2	
✓	Arsenic	3.0	47	5.6	14	3.5	5.0	4.0	4.0			1 ppm
✓	Beryllium	.28	1.3	.32	.81	.2	.7	.22	.38			
✓	Cadmium	0.1	1.2	0.2	0.6	0.5	0.1	0.1	0.8			0.1 ppm
✓	Chromium	20	40	25	25	20	35	35	25			
✓	Copper	8	160	39	60	34	23	19	30			1 ppm
✓	Lead	4	160	17	80	37	12	11	160			1 ppm
✓	Mercury	ND	0.3	ND	1.6	1.2	0.1	0.1	0.7			0.1 ppm
✓	Nickel	30	25	25	15	10	50	45	30			
✓	Selenium	ND	ND	ND	ND	ND	ND	ND	ND		.5	
✓	Silver	28	14	4	1.4	.2	1	.1	.7			
✓	Thallium	ND	ND	ND	ND	ND	ND	ND	ND			
✓	Zinc	33	440	140	160	50	50	50	210			1 ppm
✓	Total Cyanide	ND									<.005 mg/L	.5
✓	Total Phenol	ND									<.005 mg/L	.5

INORGANIC PRIORITY POLLUTANT DATA SHEET

Lab No. 89906
 Client Pos
 Rec'd OK'd 6-13
 Due _____
 Analyst _____
 Chkd _____

☒ Full metal scan
☐ Partial scan (check metals of interest)

Reporting units: _____

Sample Number										Blank	LLD	Minimum Acceptable LLD
✓		I	16	17								
✓	Antimony	5	ND	2								
✓	Arsenic	44	3.0	10								1 ppm
✓	Beryllium	1.3	.32	.43								
✓	Cadmium	1.1	0.2	1.9								0.1 ppm
✓	Chromium	65	20	60								
✓	Copper	200	12	130								1 ppm
✓	Lead	330	18	300								1 ppm
✓	Mercury	0.4	0.1	0.7								0.1 ppm
✓	Nickel	35	25	40								
✓	Selenium	ND	ND	ND							.5	
✓	Silver	1.6	.3	1.7								
✓	Thallium	ND	ND	ND								
✓	Zinc	850	37	550								1 ppm
✓	Total Cyanide	ND	→								.5	
✓	Total Phenol	ND	→								.5	

VOLATILE ORGANICS DATA SHEET

UNITS OF REPORTED VALUES ug/kg

- ☒ Full Priority Pollutant Scan
- ☐ Partial Scan (check compounds of interest)

Lab No. 89906

Date Rec'd OK'd 6-13

Client POS

Date of Analysis 6/25-6/27

Analyst KL/Deb Check BAC

Due Date _____

✓	ANALYTE	A	B	C	D	E	F	G	Blank	LLD
	Chloromethane	<5	<5	<5	<5	<5	<5	<5	<1	<5
	Bromomethane	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Vinyl Chloride	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Chloroethane	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Methylene Chloride	360	840	210	240	150	110	92	20	
	Acrolein	<50	<50	<50	<50	<50	<50	<50	<10	<50
	*Acetone	270	3000	940	840	440	61	65	18	<5
	Acrylonitrile	<50	<50	<50	<50	<50	<50	<50	<10	<50
	*Carbon Disulfide	<5	<5	<5	<5	<5	<5	<5	<1	<5
	1,1-Dichloroethylene	↓	↓	↓	↓	↓	↓	↓	↓	↓
	1,1-Dichloroethane	↓	↓	↓	↓	↓	↓	↓	↓	↓
	trans-1,2-Dichloroethylene	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Chloroform	12	33	14	16		15	12		
	*2-Butanone	<5	<5	<5	<5		<5	<5		
	1,2-Dichloroethane	↓	↓	↓	↓	↓	↓	↓	↓	↓
	1,1,1-Trichloroethane	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Carbon Tetrachloride	↓	↓	↓	↓	↓	↓	↓	↓	↓
	*Vinyl Acetate	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Bromodichloromethane	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Carbon Tetrachloride	↓	↓	↓	↓	↓	↓	↓	↓	↓
	1,2-Dichloropropane	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Trichloroethylene	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Benzene	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Chlorodibromomethane	↓	↓	↓	↓	↓	↓	↓	↓	↓
	1,1,2-Trichloroethane	↓	↓	↓	↓	↓	↓	↓	↓	↓
	2-Chloroethyl vinyl ether	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Bromoform	↓	↓	↓	↓	↓	↓	↓	↓	↓
	*4-Methyl-2-pentanone	↓	↓	↓	↓	↓	↓	↓	↓	↓
	*2-Hexanone	↓	↓	↓	↓	↓	↓	↓	↓	↓
	1,1,2,2-Tetrachloroethane	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Tetrachloroethylene	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Toluene	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Chlorobenzene	↓	↓	↓	↓	↓	↓	↓	↓	↓
	trans-1,3-Dichloropropene	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Ethylbenzene	↓	↓	↓	↓	↓	↓	↓	↓	↓
	cis-1,3-Dichloropropene	↓	↓	↓	↓	↓	↓	↓	↓	↓
	*Styrene	↓	↓	↓	↓	↓	↓	↓	↓	↓
	*o-Xylene	↓	↓	↓	↓	↓	↓	↓	↓	↓
	**									
	**									
	**									
	**									

*Additional compounds from the EPA's Hazardous Substances List

**Other compounds of interest identified, in estimated amounts.

Note on report: "Samples analyzed for priority pollutants in accordance with 40 CFR, Part 136, with results as shown below:

VOLATILE ORGANICS DATA SHEET

Lab No.

F9906

Date Rec'd

OK'd 6-13

Client

Pos

Date of Analysis

6/25 - 6/27

Analyst

KL/Delo

Check

BMC

Due Date

UNITS OF REPORTED VALUES ug/kg☒ Full Priority Pollutant Scan☐ Partial Scan (check compounds of interest)

✓	ANALYTE	4	I	16	17	F DOP	Meth Blk I	Meth Blank	LLD
	Chloromethane	<5	<5	<5	<5	<5	<1	<1	<5
	Bromomethane	↓	↓	↓	↓	↓	↓	↓	↓
	Vinyl Chloride	↓	↓	↓	↓	↓	↓	↓	↓
	Chloroethane	↓	↓	↓	↓	↓	↓	↓	↓
	Methylene Chloride	150	240	130	360	210	16	trace	↓
	Acrolein	<50	<50	<50	<50	<50	<10	<10	<50
	*Acetone	1200	3600	450	1800	125	17	14	<5
	Acrylonitrile	<50	<50	<50	<50	<50	<10	<10	<50
	*Carbon Disulfide	<5	<5	<5	<5	<5	<1	<1	<5
	1,1-Dichloroethylene	↓	↓	↓	↓	↓	↓	↓	↓
	1,1-Dichloroethane	↓	↓	↓	↓	↓	↓	↓	↓
	trans-1,2-Dichloroethylene	↓	↓	↓	↓	↓	↓	↓	↓
	Chloroform	42	51	↓	69	26	↓	↓	↓
	*2-Butanone	<5	<5	↓	<5	<5	↓	↓	↓
	1,2-Dichloroethane	↓	↓	↓	↓	↓	↓	↓	↓
	1,1,1-Trichloroethane	↓	↓	↓	↓	↓	↓	↓	↓
	Carbon Tetrachloride	↓	↓	↓	↓	↓	↓	↓	↓
	*Vinyl Acetate	↓	↓	↓	↓	↓	↓	↓	↓
	Bromodichloromethane	↓	↓	↓	↓	↓	↓	↓	↓
	Carbon Tetrachloride	↓	↓	↓	↓	↓	↓	↓	↓
	1,2-Dichloropropane	↓	↓	↓	↓	↓	↓	↓	↓
	Trichloroethylene	17	16	↓	14	5	↓	↓	↓
	Benzene	<5	<5	↓	<5	<5	↓	↓	↓
	Chlorodibromomethane	↓	↓	↓	↓	↓	↓	↓	↓
	1,1,2-Trichloroethane	↓	↓	↓	↓	↓	↓	↓	↓
	2-Chloroethyl vinyl ether	↓	↓	↓	↓	↓	↓	↓	↓
	Bromoform	↓	↓	↓	↓	↓	↓	↓	↓
	*4-Methyl-2-pentanone	↓	↓	↓	↓	↓	↓	↓	↓
	*2-Hexanone	↓	↓	↓	↓	↓	↓	↓	↓
	1,1,2,2-Tetrachloroethane	↓	↓	↓	↓	↓	↓	↓	↓
	Tetrachloroethylene	↓	↓	↓	↓	↓	↓	↓	↓
	Toluene	↓	13	↓	20	8	↓	↓	↓
	Chlorobenzene	↓	<5	↓	<5	<5	↓	↓	↓
	trans-1,3-Dichloropropene	↓	↓	↓	↓	↓	↓	↓	↓
	Ethylbenzene	↓	↓	↓	↓	↓	↓	↓	↓
	cis-1,3-Dichloropropene	↓	↓	↓	↓	↓	↓	↓	↓
	*Styrene	↓	↓	↓	↓	↓	↓	↓	↓
	*o-Xylene	↓	↓	↓	↓	↓	↓	↓	↓
	**								
	**								
	**								
	**								

*Additional compounds from the EPA's Hazardous Substances List

**Other compounds of interest identified, in estimated amounts.

Note on report: "Samples analyzed for priority pollutants in accordance with 40 CFR, Part 136, with results as shown below:

Ext Date 6/17 by FL
 Anal Data 625-626 by BMC

Check BMC

UNITS OF REPORTED VALUES mg/kg

- ☒ Full Priority Pollutant Scan
☐ Partial scan (check compounds of interest)

Date Rec'd 6-13 OK'd
 Client Pos
 Due Date _____

4 mile rock - 110 ppb

✓	Analyte	A	B ¹²	C	D ¹²	E	F	G	Method	Blank	LLD
	N-nitrosodimethylamine	<50	<100	<50	<100	<50	<50	<50		<50	<50
	Bis(2-chloroethyl)ether										
	2-Chlorophenol										
	Phenol										
	1,3-Dichlorobenzene										
	1,4-Dichlorobenzene										
	1,2-Dichlorobenzene										
	Bis(2-chloroisopropyl)ether										
	Hexachloroethane										
	N-nitroso-di-n-propylamine										
	Nitrobenzene										
	Isophorone										
	2-Nitrophenol										
	2,4-Dimethylphenol										
	Bis(2-chloroethoxy)methane										
	2,4-Dichlorophenol										
	1,2,4-Trichlorobenzene		↓								
	Naphthalene		100								
	Hexachlorobutadiene		<100								
	4-Chloro-m-cresol										
	Hexachlorocyclopentadiene										
	2,4,6-Trichlorophenol										
	2-Chloronaphthalene										
	Acenaphthylene										
	Dimethylphthalate										
	2,6-Dinitrotoluene		↓								
	Acenaphthene		310								
	2,4-Dinitrophenol		400								
	2,4-Dinitrotoluene										
	4-Nitrophenol		↓								
	Fluorene		350								
	4-Chlorophenyl phenyl ether		<100								
	Diethylphthalate										
	4,6-Dinitro-o-cresol										
	1,2-Diphenylhydrazine										
	4-Bromophenyl phenyl ether										
	Hexachlorobenzene	↓		↓							
	Pentachlorophenol	65	↓	110	↓						
	Phenanthrene	68	2400	320	410						
	Anthracene	<50	720	90	150						
	Dibutylphthalate	<50	<100	<50	<100	↓					
	Fluoranthene	200	3000	380	900	80					
	Pyrene	120	2300	300	970	60					
	Benzidine	<50	400	<50	<100	<50					
	Butyl benzyl phthalate		<100	↓	↓						
	Benzo(a)anthracene		1300	130	430						
	Chrysene		1800	<50	560						
	3,3'-Dichlorobenzidine	↓	<100		<100	↓	↓	↓			
	Bis(2-ethylhexyl)phthalate	63	730		1800	340	270	110			
	N-nitrosodiphenylamine	<50	<100	↓	<100	<50	<50	<50		↓	↓

✓	ANALYTE	A	B	C	D	E	F	G	Blank	LLD
	Di-n-octyl phthalate	70	230	60	150	<50	80	190	<50	<50
	Benzo(b)fluoranthene	<50	1100	110	450	↓	<50	<50	↓	↓
	Benzo(k)fluoranthene	↓	830	110	330	↓	↓	↓	↓	↓
	Benzo(a)pyrene	↓	1200	150	460	120	100	70	↓	↓
	Indeno(1,2,3-cd)pyrene	↓	440	60	170	<50	<50	<50	↓	↓
	Dibenzo(ah)anthracene	↓	<100	<50	<100	↓	↓	↓	↓	↓
	Benzo(ghi)perylene	↓	440	60	180	↓	↓	↓	↓	↓
	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)									
	*Aniline	<50	<100	<50	<100	<50	<50	<50	<50	<50
	*Benzoic Acid	↓	↓	↓	↓	↓	↓	↓	↓	↓
	*Benzyl Alcohol	↓	↓	↓	↓	↓	↓	↓	↓	↓
	*4-Chloroaniline	↓	↓	↓	↓	↓	↓	↓	↓	↓
	*Dibenzofuran	↓	210	↓	↓	↓	↓	↓	↓	↓
	*2-Methylnaphthalene	↓	400	↓	↓	↓	↓	↓	↓	↓
	*2-Methylphenol	↓	↓	↓	↓	↓	↓	↓	↓	↓
	*4-Methylphenol	↓	↓	↓	↓	↓	↓	↓	↓	↓
	*2-Nitroaniline	↓	↓	↓	↓	↓	↓	↓	↓	↓
	*3-Nitroaniline	↓	↓	↓	↓	↓	↓	↓	↓	↓
	*4-Nitroaniline	↓	↓	↓	↓	↓	↓	↓	↓	↓
	*2,4,5-Trichlorophenol	↓	↓	↓	↓	↓	↓	↓	↓	↓
	**									
	**									
	**									
	**									
	**									
	**									

*Additional compounds from the EPA's Hazardous Substances List

**Other compounds of interest identified, in estimated amounts.

Note on report: "Samples analyzed for priority pollutants in accordance with 40 CFR, Part 136, with results as shown below:"

Anal Data 6/25/92 by BML

Check BML

UNITS OF REPORTED VALUES $\mu\text{g/Kg}$

☒ Full Priority Pollutant Scan

☐ Partial scan (check compounds of interest)

Client Pis
Due Date _____

4 Mile Rock 100 ppb

✓	Analyte	H ¹⁴	I ¹²	J ¹²	K ¹⁴	E DUP			Blank	LLD
	N-nitrosodimethylamine	<200	<100	<100	<200	<50				
	Bis(2-chloroethyl)ether									
	2-Chlorophenol									
	Phenol									
	1,3-Dichlorobenzene				↓					
	1,4-Dichlorobenzene				2300					
	1,2-Dichlorobenzene				<200					
	Bis(2-chloroisopropyl)ether									
	Hexachloroethane									
	N-nitroso-di-n-propylamine									
	Nitrobenzene									
	Isophorone									
	2-Nitrophenol									
	2,4-Dimethylphenol									
	Bis(2-chloroethoxy)methane									
	2,4-Dichlorophenol									
	1,2,4-Trichlorobenzene	↓			↓					
	Naphthalene	4600			7000					
	Hexachlorobutadiene	<200			<200					
	4-Chloro-m-cresol									
	Hexachlorocyclopentadiene									
	2,4,6-Trichlorophenol									
	2-Chloronaphthalene	↓								
	Acenaphthylene	320								
	Dimethylphthalate	<200								
	2,6-Dinitrotoluene	↓	↓		↓					
	Acenaphthene	3000	220		3500					
	2,4-Dinitrophenol	<200	400		<200					
	2,4-Dinitrotoluene	↓	↓		↓					
	4-Nitrophenol	↓	↓		↓					
	Fluorene	2900	240		3200					
	4-Chlorophenyl phenyl ether	<200	400		<200					
	Diethylphthalate									
	4,6-Dinitro-o-cresol									
	1,2-Diphenylhydrazine									
	4-Bromophenyl phenyl ether									
	Hexachlorobenzene									
	Pentachlorophenol	↓	↓	↓	↓					
	Phenanthrene	9400	1500	180	8900					
	Anthracene	4700	610	140	4500					
	Dibutylphthalate	<200	<100	<100	<200	✓				
	Fluoranthene	12,100	2500	290	7300	90				
	Pyrene	14,100	2700	850	19,000	110				
	Benzidine	<200	<100	<100	<200	<50				
	Butyl benzyl phthalate	<200	↓	↓	↓	↓				
	Benzo(a)anthracene	4100	1400	250	4200	60				
	Chrysene	5300	2000	520	7100	70				
	3,3'-Dichlorobenzidine	<200	<100	<100	<200	<50				
	Bis(2-ethylhexyl)phthalate	300	960	170	1100	530				
	N-nitrosodiphenylamine	<200	<100	<100	<200	<50				
LOW PAH		14920	2570	320	28100	ND				
Hi, PAH		46310	13910	3550	67950	530				

✓	ANALYTE	H	I	16	17	E DOP			Blank	LLD
	Di-n-octyl phthalate	<200	210	<100	<200	80				
	Benzo(b)fluoranthene	3300	1200	480	4400	60				
	Benzo(k)fluoranthene	2900	1200	420	3400	140				
	Benzo(a)pyrene	3000	1500	530	4700	<50				
	Indeno(1,2,3-cd)pyrene	790	500	210	1800					
	Dibenzo(ah)anthracene	<200	110	<100	350					
	Benzo(ghi)perylene	720	500	↓	2300	↓				
	2,3,7,8-Tetrachlorodibenzo- p-dioxin (TCDD)									
	*Aniline	<200	<100	<100	<200	<50				
	*Benzoic Acid	↓	↓		↓	↓				
	*Benzyl Alcohol	↓	↓		↓	↓				
	*4-Chloroaniline	↓	↓		↓	↓				
	*Dibenzofuran	1700	110		2300					
	*2-Methylnaphthalene	1300	<100		2300					
	*2-Methylphenol	<200			<200					
	*4-Methylphenol	↓	↓		↓	↓				
	*2-Nitroaniline	↓	↓		↓	↓				
	*3-Nitroaniline	↓	↓		↓	↓				
	*4-Nitroaniline	↓	↓		↓	↓				
	*2,4,5-Trichlorophenol	↓	↓	↓	↓	↓				
	**									
	**									
	**									
	**									
	**									
	**									

*Additional compounds from the EPA's Hazardous Substances List

**Other compounds of interest identified, in estimated amounts.

Note on report: "Samples analyzed for priority pollutants in accordance with 40 CFR, Part 136, with results as shown below:"

8990

PESTICIDES DATA SHEET

Extract Date 6/18 by FL
Analysis Date 6/26 by mc

Check _____

☒ Full pesticide scan

☐ Partial scan (check pesticides of interest *)

Lab No. 89906
Rec'd Date OK'd 6-13
Client P65
Due Date _____

UNITS REPORT µg/kg
Lower Limit of Detection.

4 Mile Rock.

[illegible]

Edup
AID

Mistake
he own
Twice

38	2	0.5
----	---	-----

Find	Charges

PESTICIDES DATA SHEET

Extract Date 6/18 by FL
 Analysis Date 6/26 by MC

Check _____

- ☒ Full pesticide scan
☐ Partial scan (check pesticides of interest *)

Lab No. 89966
 Rec'd Date OK'd 6-13
 Client POS
 Due Date _____

UNITS REPORT _____

LLD = Lower Limit of Detection.

4 Mile Rock

SAMPLE NUMBER	BLANK	LLD	G	H	I	16	17
alpha-BHC		1	ND	ND	ND	ND	ND
beta-BHC							
delta-BHC							
gamma-BHC (lindane)							
heptachlor							
aldrin							
heptachlor epoxide							
dieldrin							
4,4'-DDE				↓	4		↓
4,4'-DDD				6	20		67
endosulfan sulfate				ND	ND		ND
4,4'-DDT							
chlordan							
alpha endosulfan							
beta endosulfan							
endrin							
endrin aldehyde		↓					
toxaphene		50					
PCB 1016		20					
PCB 1221							
PCB 1232							
PCB 1242							
PCB 1248							
PCB 1254							
PCB 1260		↓	↓	630	640	↓	190

POLYCYCLIC AROMATIC HYDROCARBONS
Lab Sheet

Lab No. 89906
Client PO5
Date Rec'd OK'd 6-13
Date Due _____

Analyst _____
Chk'd by _____

Sample(s) analyzed for Gravimetric Polycyclic Aromatic Hydrocarbons in accordance with Washington State Department of Ecology WAC 173-302. The method requires analysis of the samples through successive stages until the result obtained is less than 1% by weight (as received basis) or until the fourth stage has been completed. Results are as shown below:

% by weight, as received basis*

Stage	Sample Number							
	16	17	AD _{up}	FD _{up}				
1: Soxhlet Extraction	.15	.26	.15	.16				
Acid-base 2: clean up	---	---	---	---				
Silica gel 3: chromatography	---	---	---	---				
High Performance 4: Liquid Chromatography (HPLC) Analysis	---	---	---	---				

*for 4,5,6 membered rings

Note to analyst: 1) Indicate by a --- stages which were not performed.
2) Report actual values, not "less than 1%".

☒ Group I needs the crude extract (after soxhleting) for halogenated hydrocarbons.

☒ Group I needs to share the sample.

☒ Your group has additional work to perform on these samples. See lab entry cover sheet.

HAZARDOUS WASTE DATA SHEET - Inorganics

Extraction Type:



D.O.E.

E.P. Toxicity

Lab No. 89906Date OK 6-13Client PLS

Analyst

Due Date

Check INR

Sample Number

A	B	C	D	E	F	G	H	I	LLD	NCL
---	---	---	---	---	---	---	---	---	-----	-----

pH

										Must be 1) b/w 2.0 and 12.5
--	--	--	--	--	--	--	--	--	--	-----------------------------

CONCENTRATION, mg/L

Arsenic

Barium

Cadmium

Chromium

Cr+6

Lead

Mercury

Selenium

Silver

ND									>	.2	5.0
.3	.3	ND	.3	ND	.3	.2	.5	.5	A	100.	
ND									>	.01	1.0
ND									>	.1	5.0
											5.0
ND									>	.1	5.0
ND									>	.005	0.2
ND									>	.2	1.0
ND									>	.1	5.0

Sample Preparation Log

Separation

Extraction

Filtration

✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

Notes on flammability and other requests:

This sample also has organics on it. Group II will need extract.

HAZARDOUS WASTE DATA SHEET - Inorganics

Extraction Type:



D.O.E.

E.P. Toxicity

Lab No.

89906

Date

OK'd 6-13

Client

Pos

Analyst

Check

Due Date

JBR

Sample Number

16	17									LLD	MCL
----	----	--	--	--	--	--	--	--	--	-----	-----

pH

											Must fall betw. 2.0 and 12.5
--	--	--	--	--	--	--	--	--	--	--	------------------------------

CONCENTRATION, mg/L

ND	ND									.2	5.0
.2	.6										100.
ND	ND									.01	1.0
ND	ND									.1	5.0
	7.										5.0
ND	.1									.1	5.0
ND	ND									.005	0.2
ND	ND									.2	1.0
ND	ND									.1	5.0

Sample Preparation Log

Separation

Extraction

Filtration

✓	✓										
✓	✓										

Notes on flammability and other requests:

This sample also has organics on it. Group II will need extract.

Extraction Type:

Lab No. 89906
Date OK'd 6-13
Client PIS
Analyst Mc/Te Check _____
Due Date _____

A	B	C	D	E	F	G	H	I	LLD	MCL
---	---	---	---	---	---	---	---	---	-----	-----

~~Endrin~~ Endrin

[illegible]

2,4-D

2,4,5-TP
(silvex)

Lindane

 This sample also has inorganics on it. Obtain extract from Group I.

☐ This sample set does not have inorgs. Give sample to Group I to extract and make sure information below is completed:

Separation

Extraction

Filtration

Extraction Type:

Lab No. 89906
Date OK'd 6-13
Client POS
Analyst _____ Check _____
Due Date _____

[illegible]

 Endrin

Toxaphene

2,4-D

2,4,5-TP
(silvex)

Lindane

NP	NO							.0002	0.02
NP	NO							.001	0.0
NP	NO							.005	0.5
ND	ND							0.005	0.0
↓	↓							0.005	1.0
NO	NO							.0002	0.4

~~A~~ This sample also has inorganics on it. Obtain extract from Group I.

 This sample set does not have inorgs. Give sample to Group I to extract and make sure information below is completed:

Separation

Extraction

Filtration

[illegible]